

Social Security

10.1 A BRIEF HISTORY OF SOCIAL SECURITY

Note: Much of the following history has been extracted from the Social Security Administration document Social Security—A Brief History. The full text is available on the World Wide Web at <http://www.ssa.gov/history/brief.html>

THE PROBLEM OF ECONOMIC SECURITY

Prior to the turn of the 20th century, the majority of people in the United States lived and worked on farms, and they depended upon their children, relatives, or charity to provide economic security. However, the Industrial Revolution changed this dependence. The extended family and the family farm as sources of economic security became less common.

The first American company to provide for its employees who left work due to old age was the American Express Company; it established the first private pension plan in 1875. The Baltimore & Ohio Railroad Company established the second plan in 1880. However, private plans such as these eased the economic problem of old age for only a small segment of workers. All people throughout human history have faced the uncertainties brought on by death, disability, and old age. Social Security addressed a universal human need, a measure of economic dignity during old age. The Great Depression of 1929 triggered a crisis in the nation's economic life. Factories closed, workers were deprived of "pensions," workers lost their dignity (families were evicted from their homes with their furniture piled on curbs outside, and many lived only on welfare provided by the states, or were forced to work on "poor farms.") It was against this backdrop that the Social Security Act emerged.

THE SOCIAL SECURITY ACT

President Franklin D. Roosevelt sent a message to the Congress of the United States on June 8, 1934 in which he announced his intention to provide a program for Social Security. Subsequently, the president, by Executive Order, created the Committee on Economic Security, which was comprised of Frances Perkins, secretary of labor, Henry Morgenthau, Jr., secretary of the treasury; Henry A. Wallace, secretary of agriculture; Homer S. Cummings, attorney general; and Harry L. Hopkins, Federal Emergency Relief administrator. The committee, which was chaired by Frances Perkins, was instructed to study the entire problem of economic insecurity and to make recommendations that would serve as the basis for legislative consideration by the Congress.

In early January 1935, the committee made its report to the President, and on January 17 President Roosevelt introduced the report to both houses of Congress for simultaneous consideration. Each House passed its own version, but eventually the differences were resolved, and the President signed the Social Security Act into law on August 14, 1935. In addition to several provisions for general welfare, the new Act created a social insurance program designed to pay retired workers, age 65 or older, a continuing income after retirement.

MAJOR PROVISIONS OF THE ACT

The Social Security Act did not quite achieve all the goals its supporters had hoped for by way of providing a "comprehensive package of protection" against the hazards of life. Certain features of that package, notably disability coverage and medical benefits, would have to await future developments. But it did provide a wide range of programs to meet the Nation's needs. In addition to the program we now think of as Social Security, it included unemployment insurance, old age assistance, aid to dependent children, and grants to the states to provide various forms of medical care.

The two major provisions relating to the elderly were Title I – Grants to States for Old-Age Assistance, which supported state welfare programs for the aged, and Title II – Federal Old-Age

Benefits. Title II was the new social insurance program that we now think of as Social Security. In the original Act, benefits were to be paid only to the primary worker when he or she retired at age 65. Benefits were to be based on payroll tax contributions that the worker made during his or her working life. Taxes would first be collected in 1937 and monthly benefit payments would begin in 1942. The new social insurance program sought to address the long-range problem of economic security for the aged through a contributory system in which the workers themselves contributed to their own future retirement benefit by making regular payments into a joint fund. It was thus distinct from the welfare benefits provided under Title I of the Act and from the various States' "old-age pensions." As President Roosevelt conceived of the Act, Title I was to be a temporary "relief" program that would eventually disappear as more people were able to obtain retirement income through the contributory system. The new social insurance system was a very moderate alternative to the radical calls to action that were so common in America in the 1930s.

A provision of the Act established a Social Security Board with a charge to create a protocol for implementing the program. One of its first tasks was to assign Social Security numbers (SSNs) to all workers. (The lowest SSN was the number assigned to Grace Dorothy Owen, a New Hampshire resident. She received the number 001-01-0001.) The Social Security Board was abolished in 1946 and was replaced by the current Social Security Administration.

TRUST FUNDS

The concept of the Social Security Act was a pay-as-you-go concept. That is, those who are in the work force will pay the benefit of those who leave the work force due to old age. In order to accomplish this, President Roosevelt signed the Federal Insurance Contributions Act—FICA. It became the law of the land. This Act mandated that employers withhold taxes from employees' wages, match the employees' contributions, and remit both to the Social Security Board. The taxable wage limit for Social Security in 2010 is 6.2% of the first \$106,800 of wages and salaries. A history of the wage limits and rates is given in Table 10-3. The formula that is used by the Social Security Administration for determining the wage limit for a current year is the wage limit for 1994 times the ratio of the National Average Wage Index two years prior the current year divided by the National Average Wage Index of 1992, rounded to the nearest multiple of \$300. Letting:

y be a current year,

L_y be the Limit for a current year, and

I be the National Average Wage Index,

$$L_y = L_{1994} \left(\frac{I_{y-2}}{I_{1992}} \right). \quad (10.1-1)$$

Table 10-3 shows the National Average Wage Indices for 1992 and 2008 as 22,935.42 and 41,334.97 respectively. Equation (10.1-1), gives the wage limit for 2010 as

$$L_y = (60,600) \left(\frac{41,334.97}{22,935.42} \right) = 109,215.32$$

which when rounded to the nearest multiple of \$300 is \$109,200. The mathematics for this is

$$L = 300 \left[\left(\frac{109,215.32}{300} \right) \text{rounded to the nearest dollar} \right] = 300(364) = 109,200. \quad (10.1-1a)$$

The wage base formulas (Equations (10.1-1) and (10.1-1a)) are applicable only if there is to be a cost of living increase to the Social Security benefit. If not, the limit remains that of the previous year. Cost of Living increases are discussed in the 1950 Amendments below.

After Social Security numbers were assigned, the first FICA taxes were collected, beginning in January 1937. Since 1937 over \$10 trillion has been paid into Social Security, and over \$8 trillion has been paid out in benefits. Special Trust Funds were created to hold the excess revenues and will be used to pay future benefits when income becomes less than benefits paid. The Social Security Administration projects that the Trust Funds will be depleted around the year 2040.

AMENDMENTS TO THE ACT

1. 1939 Amendments

The original Act provided only retirement benefits to the worker. The 1939 amendments made a fundamental change in the Social Security program. The Amendments added two new categories of benefits: payments to the spouse and minor children of a retired worker (so-called dependent's benefits) and survivor's benefits paid to the family in the event of the premature death of a covered worker. This change transformed Social Security from a retirement program for workers into a family-based economic security program. The 1939 Amendments also increased benefit amounts and accelerated the start of monthly benefit payments to 1940. Payments of monthly benefits began in January 1940, and were authorized not only for aged retired workers but also for their aged wives or widows, surviving children under age 18, and surviving aged parents. On January 31, 1940, the first monthly retirement check was issued to Ida May Fuller of Ludlow, Vermont, in the amount of \$22.54. Miss Fuller died in January 1975 at the age of 100. During her 35 years as a beneficiary, she received over \$20,000 in benefits.

2. 1950 Amendments

From 1940 until 1950 virtually no changes were made in the Social Security program. Payment amounts were fixed and no major legislation was enacted. Because the program was still in its infancy, and because low levels of payroll taxation financed it, the absolute value of Social Security's retirement benefits was very low. Until 1951, the average value of the welfare benefits received under the old-age assistance provisions of the Act was greater than the retirement benefits received under Social Security. Also, there were more elderly Americans receiving old-age assistance than were receiving Social Security.

Because of these shortcomings in the program major amendments were enacted in 1950. These amendments increased benefits for existing beneficiaries for the first time, and they dramatically increased the value of the program to future beneficiaries. By February 1951 there were more Social Security retirees than welfare pensioners, and by August of that year, the average Social Security retirement benefit exceeded the average old-age assistance grant for the first time. However, it became necessary to increase benefits in order to offset the corrosive effects of inflation. These increases in benefits are known as Cost of Living Adjustments (COLAs). The 1950 Amendments that were enacted by Congress were the first legislated increase in benefits. These recalculations were effective for September 1950 and appeared for the first time in the October 1950 checks. A second increase was legislated for September 1952. Together these two increases almost doubled the value of Social Security benefits for existing beneficiaries. From that point on, benefits were increased only when Congress enacted special legislation for that purpose.

The COLA is calculated using the average increase of the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W) of the third quarter in one year to average of the third quarter of the following year. Given the following history of the CPI-W,

Month	CPI-W	
	2008	2009
July	216.304	210.526
August	215.247	211.156
September	214.939	211.322

The average for 2008 is 215.495, and the average for 2009 is 211.001. Then, the COLA for 2009, to be applied in January 2010, is determined to be

$$COLA = \frac{211.001 - 215.495}{211.001} \times 100 = -2.2\%.$$

Since the ratio is negative, the COLA will be limited to 0%, and there will not be an increase in the FICA taxable wage limit. Further, the 1983 legislation included a provision that if the assets of the Social Security trust funds are less than 20% of the annual expenditure, the COLA provision may be limited.

3. The 1954 and 1956 Amendments

The Social Security Amendments of 1954 initiated a disability insurance program that provided the public with additional coverage against economic insecurity. At first, there was a disability "freeze" (signed by President Eisenhower) of workers' Social Security records during the years when they were unable to work. While this measure offered no cash benefits, it did prevent such periods of disability from reducing or wiping out retirement and survivor benefits. On August 1, 1956, the Social Security Act was amended to provide benefits to disabled workers aged 50 to 65 and disabled adult children. Over the next two years, Congress broadened the scope of the program, permitting disabled workers under age 50 and their dependents to qualify for benefits. By 1960, 559,000 people were receiving disability benefits, with the average benefit amount being around \$80 per month. Today, the disability benefit is determined as if the worker was his/her Normal Retirement Age at the beginning of the waiting period for the disability determination.

4. The 1961 Amendments

The decade of the 1960s brought major changes to the Social Security program. Under the Amendments of 1961, the age at which men are first eligible for old-age insurance was lowered to 62, with benefits actuarially reduced (women previously were given this option in 1956.) Later in the decade (1965) Medicare coverage was enacted to help protect older Americans from being economically devastated due to illness, and a tax rate of 1.45% is applied to total FICA wages in 2010 for Medicare. In order to be qualified for benefits, 39 quarters of covered employment was necessary for those who turned 62 in 1989 or 1990, and 40 quarters were needed for those who turned 62 in 1991 and later. Before 1978, a quarter of coverage was earned for each calendar quarter that a worker had earned \$50, up to a maximum of four quarters in one year. In 1978, the requirement was changed to \$250 of covered earnings for each calendar quarter. This requirement had been indexed with inflation until 2002 when the covered earnings had increased to \$830 in a calendar quarter. However, a subsequent change in the determination of credited quarters was that the annual amount could be earned in one calendar quarter. Thus, if a worker earned \$3,320, or more, in any one quarter he or she would be given

credit for four quarters for that year. After 2002, covered earnings will be determined by multiplying \$250 by the ratio of the National Average Wage Index two years earlier to the Index of 1976 (\$9,226.48) rounded to the nearest multiple of \$10. Letting:

I be the National Average Wage Index,
 y be the current year, and
 C_E be the covered earnings,

then, the covered earnings for the current year are determined from

$$C_E = 250 \left(\frac{I_{y-2}}{I_{1976}} \right), \quad (10.1-2)$$

rounded to the nearest multiple of \$10.00. Given the current year 2010, Table 10-3 shows the National Average Wage Indices of 1976 and 2008 ($y - 2$), and application of Equation (10.1-2), with the necessary rounding gives the covered earnings as

$$C_E = 250 \left(\frac{41,334.97}{9,226.48} \right) = 1,120.01,$$

which when rounded to the nearest multiple of \$10 gives \$1,120 per quarter or \$4,480 for the year to earn four quarters of coverage.

5. The 1972 Amendments

In 1972 legislation by Congress, the law was changed to provide, beginning in 1975, for automatic annual cost of living adjustments (i.e., COLAs) based on the annual increase in the Consumer Price Index for Urban Workers and Wages. Between 1950 and 1978 inclusive, the monthly benefit was increased 636%. The increases between 1979 and this year are included in Table 10-2. Annual increases are determined in October and take effect with the following January's payment.

6. The 1977 Amendments

In 1977 Congress changed the method of determining a worker's benefit from using an Average Monthly Wage to an Average Indexed Monthly Wage (AIME). The AIME is determined as follows. The National Average Wage Index (NAWI) for the second year prior to the entitlement of a benefit is the base year and would be the year of age 60 for retirement at age 62. From age 22 through the base year, an Index Factor is determined by dividing the NAWI of the base year by the NAWI of each prior year. The Index Factor for years of age 60 and later is 1 (indexing stops with age 60). Then, the actual wages the worker earned from age 22 through one year prior to the retirement year, up to the FICA maximum for each prior year, is multiplied by the Index Factor for that year and the sum of the highest 35 years of indexed wages is divided by 420 (12 × 35). The result of this division, to the next lower dollar, is the AIME, which becomes the base for determining the final benefit.

7. The 1983 Amendments

In the early 1980s the Social Security program faced a serious long-term financing crisis. President Reagan appointed a blue-ribbon panel, known as the Greenspan Commission, to study the financing issues and make recommendations for legislative changes. The final bill, signed into law in 1983, made numerous changes in the Social Security and Medicare programs, including the taxation of Social Security benefits, the first coverage of Federal employees under

Social Security, and an increase in the retirement age in the next century. Table 10-1 is a table of the normal retirement ages established by the Greenspan Commission.

Benefits to workers may begin at age 62; however, benefits will be permanently reduced from a full retirement benefit *that has been earned through age 61* according to the formulas below.

Let:

R_w be the worker's benefit reduction,

R_s be the spouse's benefit reduction,

M_n be the normal retirement age of the worker or spouse in months, and

M_a be the number of months to the month of the actual retirement age.

The first eligibility month is the entire month in which a worker was the retirement age (62–70). Therefore, the first benefit month will be one month later except for those whose birthday is the first day of the month (only these workers will be the retirement age for the entire month). Thus, for most people $M_a = (12 \times \text{Retirement Age}) + 1$ and for those whose birthday is the first day of a month, $M_a = (12 \times \text{Retirement Age})$.

Table 10-1. Social Security Normal Retirement Ages

Year of Birth of (Workers and Spouses)	Social Security Normal Retirement Age (SSNRA)	Maximum Reduction Old Age Benefit (Retirement at Age 62)
1937 and before	65 years	20.00%
1938	65 years, 2 months	20.83%
1939	65 years, 4 months	21.67%
1940	65 years, 6 months	22.50%
1941	65 years, 8 months	23.33%
1942	65 years, 10 months	24.17%
1943 – 1954	66 years	25.00%
1955	66 years, 2 months	25.83%
1956	66 years, 4 months	26.67%
1957	66 years, 6 months	27.50%
1958	66 years, 8 months	28.33%
1959	66 years, 10 months	29.17%
1960 and later	67 years	30.00%

For workers whose birth year is later than 1937,

$$R_w = \frac{5}{9}(M_n - M_a)\% \quad M_n - M_a \leq 36 \quad (10.1-4a)$$

$$R_w = 20\% + \frac{5}{12}(M_n - M_a - 36)\% \quad M_n - M_a > 36 \quad (10.1-4b)$$

Spousal benefits are also reduced, upon the retirement of the worker, depending on the spouse's age relative to his or her own normal retirement age. The maximum spousal benefit is 50% of the worker's benefit if the spouse's age is his or her normal retirement age at the retirement of the worker. The formulas for the reduction from this maximum benefit are as follows:

For spouses whose birth year is prior to 1938,

$$R_s = \frac{25}{36}(780 - M_a)\%. \quad (10.1-5)$$

For spouses whose birth year is later than 1937,

$$R_s = \frac{25}{36}(M_n - M_a)\% \quad M_n - M_a \leq 36 \quad (10.1-6a)$$

$$R_s = 25\% + \frac{5}{12}(M_n - M_a - 36)\% \quad M_n - M_a > 36 \quad (10.1-6b)$$

Example 10.1.1. A worker was born in October 1948 and will retire in 2010 at the age of 62. The spouse was also born in October 1948 and will also be age 62 at the retirement of the worker. Determine the reduction of benefits for the worker and spouse.

Solution. Since both the worker and spouse were born in 1948 their normal retirement ages are 66 years, 0 months. The worker's normal retirement age in months, M_n , is 792. The actual benefit age in months, M_a , is $745 (12 \times 62) + 1$, and is 47 months early. For the worker, the reduction in benefits may be determined from Equation (10.1-4b) as

$$R_w = 20\% + \frac{5}{12}(792 - 745 - 36) = 24.583\%.$$

Since the spouse is at least 62 and eligible for spousal benefits, the basic spousal benefit is 50% of the worker's benefit. Because the spouse's age at retirement is less than his or her normal retirement age, the spousal reduction, *from the 50% basic benefit*, may be determined from Equation (10.1-6b) as

$$R_s = 25\% + \frac{5}{12}(792 - 745 - 36) = 29.583\%.$$

Thus, the spouse's benefit will be $35.2085\% (1.00000 - 0.29583) \times 50\%$ of the worker's primary insurance amount (PIA), a concept that will be defined in Section 10.2. Letting the subscript s represent the spouse and the subscript w represent the worker, in general,

$$PIA_s = \left(1 - \frac{R_s}{100}\right)(0.50)PIA_w. \quad (10.1-7)$$

The reduction formulas for both the worker and spouse will be revisited in Section 10.2.

8. The 1990s

From its modest beginnings, Social Security has grown to become an essential facet of modern life. One in seven Americans receives a Social Security benefit, and more than 90% of all workers are in jobs covered by Social Security. This is estimated to be 162 million people at the end of 2008. From 1940, when slightly more than 222,000 people received monthly Social Security benefits, until today, when over 51 million people receive such benefits, Social Security has grown steadily. However, the viability of the current system is being questioned. The accumulated trust fund, due to the 1983 changes and the number of workers who will be contributing to the system during the first half of this century, will be sufficient to provide

approximately 75% of the benefits to which those retirees will be entitled. There are advocates for the diversion of a part of the FICA taxes to personal, private accounts, whereas, other forces are advocating those private accounts outside the current system. We can only wait to see what the changes in the system will be, if any.

9. The 2000 Amendment

Because the country was in a severe economic depression during the 1930s one of the provisions of the Act was to discourage retirees from working in order to have jobs available for younger workers. Each year retirees between ages 62 and the Normal Retirement Month and between the Normal Retirement Month and 70 had respective earnings limits imposed whereby the monthly social security benefit would be reduced for each dollar that was earned above the limits. In April 2000, then President Clinton signed the “Senior Citizens Freedom to Work Act of 2000” that removed the limits for retirees between the Normal Retirement Age and age 70. Table 10-3 shows the history of the FICA wage limits, tax rates, and National Average Wage Indices since 1951.

PROBLEM SET 10.1

1. Verify the maximum reduction in benefits in Table 10-1 for a worker born in 1938.
 2. Verify the maximum reduction in benefits in Table 10-1 for a worker born in 1939.
 3. Verify the maximum reduction in benefits in Table 10-1 for a worker born in 1940.
 4. Verify the maximum reduction in benefits in Table 10-1 for a worker born in 1941.
 5. Verify the maximum reduction in benefits in Table 10-1 for a worker born in 1942.
 6. Verify the maximum reduction in benefits in Table 10-1 for a worker born in 1943.
 7. Verify the maximum reduction in benefits in Table 10-1 for a worker born in 1951.
 8. Verify the maximum reduction in benefits in Table 10-1 for a worker born in 1957.
 9. Verify the maximum reduction in benefits in Table 10-1 for a worker born in 1958.
 10. Verify the maximum reduction in benefits in Table 10-1 for a worker born in 1959.
 11. Verify the maximum reduction in benefits in Table 10-1 for a worker born in 1960.
 12. Verify the maximum reduction in benefits in Table 10-1 for a worker born in 1961.
 13. Verify the maximum reduction in benefits in Table 10-1 for a worker born in 1962.
- Determine the reduction in old age benefits for Problems 14–20.
14. A worker was born in 1948 and will retire at age 62 years and six months.
 15. A worker was born in 1947 and will retire at age 63 years.
 16. A worker was born in 1947 and will retire at age 63 years and nine months.
 17. A worker was born in 1946 and will retire at age 64 years.
 18. A worker was born in 1946 and will retire at age 64 years and three months.
 19. A worker was born in 1945 and will retire at age 65.
 20. A worker was born in 1945 and will retire at age 65 years and six months.
 21. A worker retires in 2010. His/her spouse was born in 1944 and is 66 years old
 - a) What will be the reduction in the spousal benefit?
 - b) What percent of the worker’s benefit will the spouse receive?
 22. A worker retires in 2010. His/her spouse was born in 1944 and is age 66 years, 2 months.
 - a) What will be the reduction in the spousal benefit?
 - b) What percent of the worker’s benefit will the spouse receive?
 23. A worker retires in 2010. His/her spouse was born in 1945 and is age 64 years, 8 months.
 - a) What will be the reduction in the spousal benefit?
 - b) What percent of the worker’s benefit will the spouse receive?
 24. A worker retires in 2010. His/her spouse was born in 1947 and is age 63 years, 5 months.
 - a) What will be the reduction in the spousal benefit?
 - b) What percent of the worker’s benefit will the spouse receive?

25. A worker retires in 2010. His/her spouse was born in 1948 and is age 62 years, 3 months.
- What will be the reduction in the spousal benefit?
 - What percent of the worker's benefit will the spouse receive?

10.2 DETERMINATION OF BENEFITS

The first calculation in the determination of benefits is the *Primary Insurance Amount*, or PIA. For most current and future retirees, the PIA is determined using the 35 highest inflation-adjusted wages for earnings from 1951 or age 22, whichever is later, through the year before the retirement year. It is a three-step calculation.

1. The Average Indexed Monthly Earnings (AIME)

The Average Indexed Monthly Earnings are based on actual earnings from the later of 1951 or the year of age 22 to the year prior to the beginning of Social Security benefits. The actual earnings, up to the FICA wage limit, are multiplied by an index factor that is determined by dividing the National Average Wage Index for the age-60 year by the National Average Wage Index for each year from 1951 or the year of age 22. Indexing stops at the age-60 year and actual earnings from age 60 through one year before the retirement year are used. *The wages earned during the retirement year are not used.*

For a worker who was born in 1944 the age-60 year would be 2004. The National Average Wage Index for 2004 was \$35,648.55. As an example for an arbitrary particular year, the National Average Wage Index for 1980 was \$12,513.46. Then, the index factor for 1980 would be 35,648.55 divided by 12,513.46 or 2.84882, rounded to five decimal places. The indexed wage for 1980 would be the *actual* wage amount, up to the FICA wage limit for that year, multiplied by 2.84882. That product indicates that, for a person who earned the wage limit of \$25,900 in 1980, the indexed earnings would be \$73,784.44. The same procedure is used for all years from 1951, or age 22, whichever is later, through the year prior to the start of Social Security benefits.

Table 10-4 shows the index factors and indexed earnings for all workers whose wages were equal to or greater than the FICA wage limit and will have retired in 2010 at age 62. It may be seen that the age-60 year is 2008. Table 10-5 shows the index factors and indexed earnings for all workers whose wages were equal to or greater than the FICA wage limit and will have retired in 2010 at the normal retirement age and age 66. It may be seen that the age-60 year to be 2004. Table 10-6 shows the index factors and indexed earnings for all workers whose wages were equal to or greater than the FICA wage limit and will have retired in 2010 at age 70. It may be seen that the age-60 year, is 2000. The base year for the benefit determination is the age-62 year, and the terminating year for retirement in 2010 is 2009. The number of years from 1951 or age 22 to age 62, or the retirement year, is 40 or more. However, only the 35 highest indexed earnings years, as shown in Tables 10-4, 10-5, and 10-6, are added and then divided by 420 (35 years \times 12 months/year) rounded to the next lower \$1.00 to arrive at the number which is referred to as the Average Indexed Monthly Earnings (AIME).

2. The Primary Insurance Amount (PIA)

The AIME does not translate, dollar-for dollar, into the Social Security benefit. The Primary Insurance Amount is the base for determining the benefit. In order to ensure that more of the earnings of lower wage earners are included in the Social Security benefit, the Social Security Administration uses a concept known as "bend points" that are adjusted each year for inflation and a calculation using a fixed percent of each bend point. The bend points for the years 1979 through 2010 are shown in Table 10-2, and the Primary Insurance Amount is determined using the bend points for the age-62 year. The bend points are determined as follows. Letting:

y be the current year,
 B_L be the lower bend point,
 B_U be the upper bend point, and
 I be the National Average Wage Index,

$$B_L = 180 \left(\frac{I_{Y-2}}{I_{1977}} \right), \quad (10.2-1a)$$

and

$$B_U = 1,085 \left(\frac{I_{Y-2}}{I_{1977}} \right). \quad (10.2-1b)$$

Both of these results are rounded to the nearest dollar. For age 62 in 2010, Equation (10.2-1a) and Equation (10.2-1b) give the bend points as

$$B_L = 180 \left(\frac{41,334.97}{9,779.44} \right) = 760.81,$$

which rounds to \$761 and

$$B_U = 1,085 \left(\frac{41,334.97}{9,779.44} \right) = 4,585.99,$$

which rounds to \$4,586. For those who retire in 2010 at age 66, the age-62 year is 2006, and for the worker who retires in 2010 at age 62, the age-62 year is 2010. The formula for the PIA is as follows.

Using the bend points and the statutory percent of each for the age-62 year, let

$A = 90\%$ of the Lower Bend Point, and

$B = 32\%$ of the (AIME – Lower Bend Point) if the AIME \leq Upper Bend Point,

or

$B = 32\%$ of the Middle Range if the AIME $>$ Upper Bend Point, and

$C = 15\%$ of the (AIME – Upper Bend Point).

Then,

PIA = $A + B$ if the AIME \leq Upper Bend Point, or

PIA = $A + B + C$ if the AIME $>$ Upper Bend Point.

The applicable sum is *rounded down* to the next lower 10 cents to obtain the final base PIA.

3. The Initial Monthly Benefit

The result of Step 2 gives the worker's Primary Insurance Amount as of the year of age 62 (or two years prior to disability) and includes FICA earnings to the year before retirement. As indicated in Section 10.1, the PIA is reduced for workers who retire before their normal retirement date. There is no reduction for workers who retire early due to disability or retire in their normal retirement month during their normal retirement year. After the appropriate reduction, if any, the PIA is increased by cost of living adjustments (COLAs) to the retirement year. Thus, for a birth year of 1944 and retirement in 2010 at the normal retirement age of 66

years, the age-62 year is 2006, and the COLAs are for the years of age 63 (2007) age 64 (2008), and age 65 (2009), and age 66 (2010). Since the fiscal year of the U.S. Government is from October 1 through the following September 30, the COLAs would have been announced in October of the years 2006, 2007, 2008, and 2009, respectively, and each would take effect on January 1st of 2007, 2008, 2009, and 2010 respectively. However, there would be a reduction for an “early” retirement prior to the normal retirement date unless the individual waited until he or she reached the normal retirement age. Cost of living adjustment rates are given in Table 10-2 for the years in which they are announced. Each cost of living rate is applicable for the following year. The accumulated amount for each year is also *rounded down* to the next lower 10 cents and is used as the basis for the following year. The final accumulation is *rounded down* to the next lower \$1.00. This final amount is the retiree’s initial Social Security benefit. The final rounding takes place after the deduction of the premium, if any, for Medicare Part-B. We will not consider that aspect in this writing.

Example 10.2.1. A worker will retire in 2010 at age 62, and the worker’s wages have been at least the FICA wage limit from 1970 (age 22) through 2009. The total of the 35 years of highest indexed earnings through 2009 is \$3,338,959 as shown in Table 10-4. Determine the initial monthly benefit.

Solution. Age 62 is the first eligible year for elective Social Security retirement. The AIME for all workers whose wages have been equal to at least the FICA wage limit and who retire at age 62 in 2010 will be \$7,949, ($3,338,959 \div 420$ rounded to the next lower dollar). The PIA would be determined using the bend points of 2010, the age-62 year, and are given in Table 10-2 as 761 for the lower bend point, 3,825 for the middle range, and 4,586 for the upper bend point. Since the AIME is greater than the upper bend point, the PIA is determined as follows.

$$\begin{aligned} A &= 90\% \text{ of } 761 = 684.90, \\ B &= 32\% \text{ of } 3825 = 1224.00, \text{ and} \\ C &= 15\% \text{ of } (7949 - 4586) = 504.45 \end{aligned}$$

The sum of $A + B + C = 2,413.35$ and is rounded down to \$2,413.30 for the base PIA. Since this worker will retire before the normal retirement date, a permanent reduction in the base PIA is imposed. For age 62 in 2010, the birth year was 1948 and the normal retirement age is 66. The reduction formula for the normal retirement age is given in Section 10.1 as Equation (10.1-4a) or Equation (10.1-4b) The number of months to the normal retirement age is 792 (12×66), and the number of months to the beginning of benefits is 745 ($12 \times 62 + 1$) The difference is 47 months. Thus, if a worker retires in 2010 at age 62, Equation (10.1-4b) shows that the base PIA will be reduced by

$$R_w = 20\% + \frac{5}{12}(792 - 745 - 36) = 24.6\%.$$

and the final PIA will be 75.42% of the base PIA. Then, this worker’s PIA will be reduced to

$$\text{PIA} = (1 - 0.2458)(2413) = 1,820.03$$

The cents are dropped and the PIA is 1,820. Since this worker is 62 in 2010, the first COLA would be implemented in January 2011; therefore, there will not be a COLA adjustment. The initial monthly benefit for retirement in 2010 at age 62 will be \$1,820, after dropping the cents.

Example 10.2.2. A worker was born in January, 1944 and will retire in January, 2010 at age 66 years. The worker's wages have been at least the FICA wage limit from 1966 (age 22) through 2009. The total of the highest 35 years of indexed earnings through 2009 is \$2,929,960 giving an AIME of \$6,976 as shown in Table 10-5. Determine the initial monthly benefit.

Solution. The normal retirement age for persons who were born in 1944 is 66 years (as shown in Table 10-1) and this date will occur in 2010. For age 66 in 2010 the age-62 year is 2006, and the bend points for that year are obtained from Table 10-2 as 656 for the lower bend point, 3,299 for the middle range, and 3,955, for the upper bend point. Since the AIME is greater than the Upper Bend Point, the PIA is determined using as follows.

$$\begin{aligned} A &= 90\% \text{ of } 656 = 590.40 \\ B &= 32\% \text{ of } 3825 = 1055.68, \text{ and} \\ C &= 15\% \text{ of } (6976 - 3955) = 453.15. \end{aligned}$$

The sum $A + B + C = 2,099.23$ and is rounded down to the next lower 10 cents, or 2,099.20 for the PIA. The applicable COLA rates may be obtained from Table 10-2 as 3.3% for the age-63 year (2007), 2.3% for the age-64 year (2008), 5.8% for the age-65 year (2009) and 0.0% for the normal retirement year (2010). The accumulation to arrive at the monthly benefit is as follows:

$$\begin{aligned} 2005: & \quad (2099.20)(1.033) = 2168.47 \text{ rounded down to } 2168.40. \\ 2006: & \quad (2168.40)(1.023) = 2218.27 \text{ rounded down to } 2218.20. \\ 2007: & \quad (2218.20)(1.058) = 2346.86 \text{ rounded down to } 2346.80, \text{ and} \\ 2008: & \quad (2346.80)(1.000) = 2346.80 \text{ rounded down to } 2346.80, \end{aligned}$$

from which the cents are dropped. Then, for normal retirement in 2010 at age 66 years, a worker who has earned at least the FICA wage limit from 1966 through 2009 will receive an initial monthly benefit of \$2,346 per month. Also, this is the maximum possible benefit available for retirement in 2010 at the normal retirement age of 66 years.

DELAYED RETIREMENT

If a worker delays the retirement benefit beyond the normal retirement date, he or she will have foregone earned benefits. For the normal retirement age of 66 years in 2010, the loss of benefits can be as much as \$2,346, per month; the maximum possible benefit for the normal retirement age. This would also be increased by future COLAs. In order to compensate for this loss of benefit, the law mandates a delayed retirement credit (DRC) to be included in the calculation of benefits when retirement does occur. The rates of the delayed credits are shown in Table 10-2, and the worker's PIA would be increased by a simple interest calculation for the number months that the benefit was delayed as follows:

$$B_d = \left[1 + \left(\frac{DRC}{12} \right) (M_d - M_n) \right] PIA_d. \quad (10.2-2)$$

where,

- PIA_d is the PIA for the delayed retirement age,
- DRC is the Delayed Retirement Credit,
- M_d is the delayed retirement age in the number of whole months,
- M_n is the normal retirement age in the number of whole months, and
- B_d is the delayed benefit

Social Security benefits will begin automatically at age 70; therefore, the maximum delay in retirement is four years (48 months) for workers born in 1944 who would reach their normal retirement age in 2010. Then, for a person who is the normal retirement age in 2010 and does not collect benefits until age 70, Table 10-2 shows that the DRC for workers born in 1944 is 8.0%. The maximum delayed credit will be 32% (8.0% divided by 12 for each month of delay times 48 months). After applying COLAs to the PIA for the years from age 62 through the delayed retirement year in the same manner as in the determination of early and normal retirement benefits the resulting benefit is increased by the appropriate DRC. Recall that each accumulation is rounded down to the next lower 10 cents, and this value is used as the base for the next accumulation. As before, the final accumulation is rounded down to the next lower \$1.00. Further, the worker's PIA may also increase in that for each year of delayed benefits a high earnings year may replace a low earnings year in the 35 indexed earnings years that are used to determine the AIME.

Example 10.2.3. A worker who was born in January 1940 began to collect benefits in January 2010 at age 70. Since age 22, this worker has always earned wages that were at least the FICA wage limit each year. Determine the initial monthly benefit.

Solution. Because the worker did not begin to collect benefits until after the normal retirement age of 65 years 6 months for workers born in 1940, the AIME will be determined by using the 35 highest indexed wages from ages 22 through 69. Referring to Table 10-6, the sum of 35 highest indexed wages is \$2,709,373 giving an AIME of \$6,450. The age-62 year was 2002 and Table 10-2 shows the bend points as 592 for the lower, 2975 for the middle range, and 3,567 for the upper. Since the AIME is greater than the upper bend point, the base PIA is determined as follows.

$$\begin{aligned} A &= 90\% \text{ of } 592 = 532.80, \\ B &= 32\% \text{ of } 2975 = 952.00, \text{ and} \\ C &= 15\% \text{ of } (6450 - 3567) = 432.45. \end{aligned}$$

The base PIA is the sum of $A + B + C$ and equals 1,917.25 and is rounded down to 1,917.20. The COLAs from age 62 will be used to increase this base PIA as follows. Table 10-2 shows these to be 1.4% for the age-63 year (2003), 2.10% for the age-64 year (2004), 2.7% for the age-65 year (2005), 4.1% for the age-66 year, (2006) 3.3% for the age-67 year (2007), 2.3% for the age-68 year (2008), 5.8% for the age-69 year (2009), and 0.0% for the age-70 year (2010). The accumulation to arrive at the monthly benefit is as follows:

$$\begin{aligned} 2003: & (1917.20)(1.014) = 1944.04 \text{ rounded down to } 1944.00 \\ 2004: & (1944.00)(1.021) = 1984.82 \text{ rounded down to } 1984.80. \\ 2005: & (1984.80)(1.027) = 2038.39 \text{ rounded down to } 2038.30. \\ 2006: & (2038.30)(1.041) = 2121.87 \text{ rounded down to } 2121.80 \\ 2007: & (2121.80)(1.033) = 2191.82 \text{ rounded down to } 2191.80 \\ 2008: & (2191.80)(1.023) = 2242.21 \text{ rounded down to } 2241.20 \\ 2009: & (2241.20)(1.058) = 2372.25 \text{ rounded down to } 2372.20 \\ 2010: & (2372.20)(1.000) = 2372.20 \text{ rounded down to } 2372.20 \end{aligned}$$

For a worker whose was born in 1940 the delayed retirement credit is 7.0%. The number of months to the delayed benefit age 70 is 840, and the number of months at the normal retirement

age of 65 years and 6 months is 786. Since the delay is 54 months, Equation (10.2-1) gives the delayed benefit as

$$B_d = \left[1 + \left(\frac{7.0}{1,200} \right) (56) \right] (2372.20) = 3119.44$$

As always, the final value is rounded down to the next lower \$1.00 and the worker's monthly benefit will be \$3,119.

BREAKEVEN

It was shown in Example 10.2.2 that the maximum benefit for age-62 retirement in 2010 will be \$1,820. With continued maximum wages and future COLAs of 3.0 %, delaying until age 66 would yield a benefit of \$2,783 and delaying until age 70 would yield a benefit of \$4,214. The economic question is “should one delay taking Social Security benefits in order to increase benefits in the future?” The answer lies with the breakeven age — the age at which the total benefit amount will be the same for either age. The FinMatics 4B software that accompanies the textbook “Mathematics of Finance and Insurance (Muksian/Pearson Custom Publishing, 2009) shows that for a birth month of January with the first benefit month being February, 2010, breakeven between age 62 and age 66 will be at age 74 years, 3 months with an estimated total revenue of \$348,996 and breakeven between age 62 and age 70 will occur at age 76 years, 9 months with estimated total revenue of \$431,931. The breakeven age between age 66 (with a benefit of \$2,346) and age 70 (with a benefit of \$3,610) is 78 years and 3 months with estimated total revenue of \$442,970. These values may be obtained from the following formulas. These values may be confirmed by substituting the appropriate values into Equations (10.2-3) for the number of years to breakeven, , and (10.2-4a) or (10.2-4b) for the estimated total revenue.

$$t = \frac{\ln \left[\frac{12(1+r)(B_2 - B_1) - r(n_2 B_2 - n_1 B_1)}{12(1+r)(B_2(1+r)^{-(A_2-A_1)} - B_1)} \right]}{\ln(1+r)}, \quad (10.2-3)$$

the subscripts 1 and 2 refer to the respective early and delayed values,

A = the respective early or delayed retirement age,

B = the benefit during the early or delayed first year,

n = the number of months of benefits during the early or delayed first year

(13 – month of first payment for n_1 and 13 – month of first payment for n_2),

r = the assumed future annual cola,

t = time in years,

t_o = the integer part of t , and

m = the number of payments in the breakeven year and = the integer part of $12(t - t_o)$

The estimated total revenue that will have been received at breakeven may be calculated from

$$R = n_1 B_1 + \frac{12(1+r)B_1 \left[(1+r)^{t_o} - 1 \right]}{r} + m(1+r)^{t_o+1} B_1 \quad (10.2-4a)$$

or

$$R = n_2 B_2 + \frac{12(1+r)B_2 \left[(1+r)^{t_o-(A_2-A_1)} - 1 \right]}{r} + m B_2 (1+r)^{t_o+1-(A_2-A_1)} \quad (10.2-4b)$$

These formulas for the estimated total revenue are not strictly accurate. The monthly benefits between the first full year of benefits and the final year have not been rounded down the next lower dollar (dropping the cents), which is the reality.

SPOUSAL BENEFITS

Every worker who is covered by Social Security is entitled to his or her own benefit based on indexed earnings as shown above. However, for married couples, the spouse of an eligible worker is entitled to a “spousal benefit” whether or not the spouse had worked under covered employment. If the spouse had worked in employment that is covered by Social Security and his/her earned retirement benefit is greater than the spousal benefit, the spouse will receive the greater benefit. The formulas for spousal benefits are given in Section 10.1 as Equation (10.1-5) and Equations (10.1-6a) and (10.1-6b). The PIA for the spousal benefit is based on the age of the spouse when the worker retires. The maximum spousal benefit will be received if the “nonworking” spouse is at his or her normal retirement age when the worker retires, regardless of the worker’s age. Reduced benefits are given to spouses from age 62 through 66. The maximum spousal PIA is 50% of the worker’s PIA when the worker retires as indicated in Section 10.1. That 50% maximum is multiplied by the complements of the results of the reduction formulas Equations (10.1-5), (10.1-6a), and (10.1-6b) as shown by Equation (10.1-7).

Example 10.2.4. A worker, who was born in 1944, retires in 2010 with a full retirement benefit. The worker’s base PIA is \$2,099.20. Determine the spousal benefit if the spouse is:

- a) The normal retirement age and
- b) Age 62 on the date of the worker’s retirement.

Solution.

a) For birth in 1944 the normal retirement age is 66 years, as shown in Table 10-1. Then, the benefit reduction is 0%, and the spousal PIA equals 50% of the worker’s PIA or \$1,049.60 after rounding down to the next lower 10 cents. The spouse’s age-62 year is 2006, the same as the worker’s. As with the worker, the applicable COLA rates may be obtained from Table 10-2 as 3.3%, for the age-63 year (2007) 2.3% for the age-64 year (2008), 5.8% for the age-65 year (2009), and 0.0% for the normal retirement year (2010). The accumulation to arrive at the monthly benefit is as follows.

$$\begin{aligned} 2006: & (1049.60)(1.033) = 1084.24 \text{ rounded down to } 1084.20. \\ 2007: & (1084.20)(1.023) = 1109.14 \text{ rounded down to } 1109.10. \\ 2008: & (1109.10)(1.058) = 1173.43 \text{ rounded down to } 1173.40. \\ 2009: & (1173.40)(1.000) = 1173.40 \text{ rounded down to } 1173.40 \end{aligned}$$

The spouse’s initial monthly benefit, then, is \$1,173, after dropping the cents. Note for the case where the spouse is at normal retirement age when the worker begins to collect benefits, the spouse’s benefit would be 50% of the worker’s benefit or in this case, $(0.50 \times 2346 = 1173)$

b) If the spouse is age 62 at the retirement of the worker in 2010 the birth year would be 1948, and the normal retirement age will be 66 years. The number of months at the normal retirement age is 792 and the number of months to the beginning of benefits 745 ($12 \times 62 + 1$). Since the difference in months is 47 and is greater than 36, Equation (10.1-6b) is used to determine the PIA reduction. Then,

$$R_s = 25\% + \frac{5}{12}(792 - 745 - 36) = 29.583\%.$$

From Equation (10.1-7)

$$PIA_s = (1 - 0.29583)(0.050)PIA_w = 0.35208PIA_w.$$

The worker's PIA of \$2,099.20, which is based on the worker's age-62 year, will have increased to \$2,346.80 on the retirement date. The spouse, who is 62, will be entitled to 35.208% of that amount, or 826.26. This value is rounded to next lower 10 cents or 826. Since the spouse's age-62 year is 2010, there will not be any cost of living adjustment until January 2011, and the spousal benefit is the PIA rounded down to the next lower dollar, \$826.

Each spouse is entitled to his or her own benefit, but if the benefit of one of the spouses is less than the 50% spousal benefit, the lower-benefit spouse would receive the spousal benefit. In two-worker married couples, one the spouses may begin collecting benefits at 62 while the other spouse continues to work to a later age. In this situation, the spousal benefit will not be the same as it would be had both worked until the normal retirement age. This will be shown by example.

Example 10.2.5. The husband of a married couple, who were both born in 1948, always earned the FICA maximum taxable wage. His wife was a "stay-at-home mom" and worked sporadically always at the Social Security definition of low wages. She decided to begin Social Security benefits in 2010 at age 62. Her PIA was \$937.30. Her husband will continue to earn the maximum FICA taxable wage to his (and her) were normal retirement age of 66 and will have a benefit \$2,783, assuming that future COLAs are 3.0%.

Solution. The normal retirement age of the wife is 66 and is given in months as $M_n = 12(66) = 792$. Her actual retirement age in months is given by $M_a = 12(62) + 1 = 745$. Then, the reduction in her worker's benefit is determined by Equation (10.1-4b) as

$$R_w = 0.20 + \left(\frac{5}{1200} \right) (792 - 745 - 36) = 0.24583.$$

Her initial monthly benefit will be $(1 - 0.24583)(976.30) = \736 , after dropping the cents. When her husband retires four year later, his initial monthly benefit will be \$2,783. At that time, she will have reached her normal retirement age also and be entitled to a 50% spousal benefit, which would be \$1,391. The procedure to determine her spousal benefit is as follows. Both her unreduced PIA of \$876.30 and her benefit of \$736 would be increased by the four COLAs (rounding to the next lower 10 cents after each COLA increase). The unreduced PIA would accumulate to \$1,098.50 and would be subtracted from the \$1,391 to give a spousal benefit of \$293. Her COLA-increased benefit would be \$827 and is added the \$293 giving the wife a monthly benefit \$1,120 when her husband retires.

EARNINGS LIMITS AFTER RETIREMENT

Many people continue to work in other environments after retiring from a primary employer. For such workers the annual amounts that they can earn from FICA wage sources are limited. A reduction of the monthly benefit amount during the following year is imposed when earnings exceed the annual limits in a current year. The employer appraises the Social Security

Administration of the worker's earnings when it files the worker's form W-2, or a contractor files a Form 1099, with the IRS at the end of the year. Thus, if a worker expects to earn an amount that is significantly greater than the earnings limit for a given year, it would be prudent to notify the Social Security Administration. The appropriate reductions could be taken in the given year.

For workers who retire between ages 62 and the year of the normal retirement year the limit is \$14,160 (\$1,180 per month) in 2010 and will be indexed with inflation. The reduction that is imposed is \$1.00 for every \$2.00 for any month in which FICA earnings are in excess of that limit. The monthly exempt amount is the larger of the preceding year exempt amount (\$1,180 in 2009) and the amount for the current year determined by the following formula. It is determined by multiplying 670 by the ratio of the National Average Wage Index of two years earlier (2008) to that of 1992 rounded to the nearest multiple of \$10.00. Letting

M_E be the monthly exempt amount,
 Y be the current year, and
 I be the national average wage index,

$$M_E = 670 \left(\frac{I_{Y-2}}{I_{1992}} \right). \quad (10.2-5)$$

Table 10-3 shows that the National Average Wage Index in 1992 was \$22,935.42 and the index of 2008 ($Y-2$) is \$41,334.97. Then, Equation (10.2-4) gives the monthly exempt amount for 2010 as

$$M_E = 670 \left(\frac{41,334.97}{22,935.42} \right) = 1,207.50,$$

which, when rounded to nearest multiple of \$10.00 becomes \$1,210. However, since the COLA for 2010 is 0.00% the 2009 limit remains as \$1,180.

In general, the penalty may be determined as follows. Let:

NRA be the normal retirement age
 P be the penalty,
 E be the earnings in given year,
 L be the earnings limit for the given year, and
 B be the annual benefit.

Then,

$$P = \frac{1}{2}(E - L), \quad 62 \leq \text{Age} < 66 \quad (10.2-6)$$

The maximum earnings is the amount at which the penalty would be equal to the benefit and may be determined from

$$E_{\text{Max}} = 2B + L, \quad 62 \leq \text{Age} < 66 \quad (10.2-7)$$

where, E_{Max} is the earnings for a given year that results in \$0.00 in benefits, the maximum reduction.

Example 10.2.6. A worker retired in 2010 at age 62 with a Social Security benefit of \$1,820 per month. The worker remained a part-time consultant and earned \$3,000 per month during the remainder of the year.

- Determine the penalty reduction for this worker in 2010
- Determine the amount of earned income that this worker must earn in 2010 such that the entire Social Security benefit would be forfeited in 2010 if the Social Security Administration were not notified in 2010.

Solution. a) Since the penalty-free amount of earnings in year 2010 is \$1,180 per month, the reduction in the Social Security benefit can be determined from Equation (10.2-6) as

$$P = \frac{1}{2}(3,000 - 1,180) = 910.$$

Thus, the monthly benefit will be reduced by \$910 per month in 2010. Equation (10.2-7) shows that the maximum penalty will occur if the earnings are \$4,718 as follows

$$E_{\text{Max}} = 2(1820) + 1180 = 4,820.$$

Thus, if a worker will earn this amount in each of the remaining months of 2010 the benefit for 2011 will be reduced by \$1,820 for each month of 2010 that he or she earned the \$4,820. The Social Security Administration will arrange for a reasonable reduction of the monthly benefit during the following year in order to avoid imposing a hardship on the retiree, if the earnings limit is exceeded in a given year.

The “Senior Citizens Freedom to Work Act of 2000” removed earnings limits for those workers who receive benefits between a normal retirement age and 70. After the normal retirement age there is no penalty reduction. Stated positively, at the normal retirement age and beyond, a retiree may earn as much as he or she is able without a reduction in the Social Security benefit. However, in the year in which the worker will reach the normal retirement age, a limit of \$37,680 (\$3,140 per month in 2010) is imposed from the beginning of the year to the month prior to the normal retirement age, if the individual had already been receiving Social Security benefits due to early retirement. This exemption is determined by Equation (10.2-8) rounded to the nearest multiply of \$10.00. With the same nomenclature for Equation (10.2-5),

$$M_E = 2,500 \left(\frac{I_{Y-2}}{I_{2000}} \right). \quad (10.2-8)$$

Table 10-3 shows the indices for year 2000 to be 32,154.82 and for Y-2 (2007) to be \$41,334.97. Then, Equation (10.2-8) gives the monthly exempt amount for 2010 as

$$M_E = 2,500 \left(\frac{41,334.97}{32,154.82} \right) = 3,213.75,$$

which is rounded to the nearest multiple of \$10.00 or \$3,210, or \$38,520 during the year up to the month of the normal retirement age. If monthly income exceeds this amount, a reduction of \$1.00 for every \$3.00 above this monthly amount is imposed. Since the COLA for 2010 was 0.00%, the 2009 limits remain unchanged at \$3,140 per month or \$37,680 for the partial year.

Then, in that year of the normal retirement age, the reduction may be determined by

$$P = \frac{1}{3}(E - L). \quad \text{Age} < \text{NRA} \quad (10.2-9)$$

The maximum amount that may be earned in the year of the normal retirement age without forfeiting the entire benefits that are being received for that year may be determined by

$$E_{\text{Max}} = 3B + L. \quad \text{Age} < \text{NRA} \quad (10.2-10)$$

Consider a retired worker that is to receive \$2,075 per month in 2010 due to retirement prior to the normal retirement age. Suppose that person will reach the normal retirement age in October 2010 but returns to work in February 2010 and earns \$42,000 between February and September. Then, the benefits for February through September of 2010 would be reduced in 2010 according to Equation (10.2-9) by,

$$P = \frac{1}{3}(42,000 - 37,680) = \$1,440.$$

This aspect of the law places those individuals who achieve their normal retirement age late in the year at a disadvantage relative to those reaching it early in the year. The person who reaches the normal retirement age in January could begin collecting benefits without the effect of the earnings limit. The person who reaches the normal retirement age in December could lose prior benefits through November. Perhaps the law will be amended to eliminate this bias. Between ages 66 and 70, the individual may forego his or her benefit, and for each month that a benefit is not received, the delayed retirement credit will be applied, as noted earlier.

OTHER BENEFITS

Although not essential for the purposes of this text, there are other benefits in the Social Security System of the United States. These benefits include payments to disabled persons, to widows and/or widowers, to divorced spouses, to dependent children under 18, and to disabled dependent children at any age. The Social Security Administration provides several booklets that explain these benefits free of charge. Some of these are SSA publications numbers. 05-10024, 05-10035, 05-10069, and 05-10077.

LIMITATIONS ON SOCIAL SECURITY BENEFITS

One of the limitations on Social Security benefits is that if a worker is entitled to both Social Security and a public pension, such as Federal or State Civil Service, the Social Security benefit is reduced. That aspect is beyond the needs of this text. Private pensions do not affect Social Security benefits, and elements of private pensions are discussed in Chapter 11.

PROBLEM SET 10.2

1. A person, born in 1948, retires in 2010 at age 62. The AIME through 2009 is 5,514. Determine the PIA and initial monthly benefit.
2. A person, born in 1948, retires in 2010 at age 62. The AIME through 2009 is 3,446. Determine the PIA and initial monthly benefit.
3. A person, born in 1948, retires in 2010 at age 62. The AIME through 2009 is 1,551. Determine the PIA and initial monthly benefit.
4. A person, born in 1947, retires in 2010 at age 63. The AIME through 2009 is 5,398. Determine the PIA and initial monthly benefit.
5. A person, born in 1946, retires in 2010 at age 64. The AIME through 2009 is 7,476.

- Determine the PIA and initial monthly benefit.
6. A person, born in 1945, retires in 2010 at age 65. The AIME through 2009 is 3,114. Determine the PIA and initial monthly benefit.
 7. A person, born in 1944, retires in 2010 at age 66. The AIME through 2009 is 6,967. Determine the PIA and initial monthly benefit.
 8. A person, born in 1944 retires in 2010 at age 66. The AIME through 2009 is 4,834. Determine the PIA and initial monthly benefit.
 9. A person, born in 1943 retires in 2010 at age 67. The AIME through 2009 is 6,728. Determine the PIA and initial monthly benefit.
 10. A person, born in 1942 retires in 2010 at age 68. The AIME through 2009 is 6,005. Determine the PIA and initial monthly benefit.
 11. A person, born in 1941 retires in 2010 at age 69. The AIME through 2009 is 6,557. Determine the PIA and initial monthly benefit.
 12. A person, born in 1940 retires in 2010 at age 70. The AIME through 2009 is 4,462. Determine the PIA and initial monthly benefit.

In Problems 13–24 determine the initial monthly benefit of the spouse.

13. The spouse of the worker in Problem 1 was born in 1948 and is 62.
14. The spouse of the worker in Problem 2 was born in 1948 and is 62.
15. The spouse of the worker in Problem 3 was born in 1948 and is 62.
16. The spouse of the worker in Problem 4 was born in 1947 and is 63.
17. The spouse of the worker in Problem 5 was born in 1946 and is 64.
18. The spouse of the worker in Problem 6 was born in 1945 and is 65.
19. The spouse of the worker in Problem 7 was born in 1944 and is 66.
20. The spouse of the worker in Problem 8 was born in 1944 and is 66.
21. The spouse of the worker in Problem 9 was born in 1943 and is 67.
22. The spouse of the worker in Problem 9 was born in 1942 and is 68.
23. The spouse of the worker in Problem 9 was born in 1941 and is 69.
24. The spouse of the worker in Problem 9 was born in 1940 and is 70.

In problems 25 through 29 assume future COLAs are 3.0 % and using Module of the Finmatics Software determine:

- a) The breakeven age, and
 - b) The total revenue to breakeven within \$100
25. A person who was born in January, 1948 and always worked for “High” wages would receive an initial monthly benefit of \$1,544 beginning in January, 2010 at age 62. If he or she waits until age 66, the initial monthly benefit will be \$2,313.
 26. A person who was born in January, 1948 and always worked for “High” wages would receive an initial monthly benefit of \$1,544 beginning in January, 2010 at age 62. If he or she waits until age 70, the initial monthly benefit will be \$3,466.
 27. A person who was born in January, 1944 and always worked for “High” wages would receive an initial monthly benefit of \$1,987 beginning in January, 2010 at age 66. If he or she waits until age 70, the initial monthly benefit will be \$2,987.
 28. A person who was born in January, 1944 and always worked for “Average” wages would receive an initial monthly benefit of \$1,506 beginning in January, 2010 at age 66. If he or she waits until age 70, the initial monthly benefit will be \$2,283.
 29. A husband and wife were born in January, 1944. The wife was a stay-at-home mom. The husband always worked for “Maximum” wages and the initial total monthly benefit would

be \$3,519 beginning in January, 2010 at age 66. If both wait until age 70, the initial monthly benefit will be \$4,973.

Table 10-2. Social Security Benefit Parameters

	Bend Points			COLAs		Delayed Credits		
	90%	32%	15%	Year	Rate	Year of Birth	Year Of Age 62	Delayed Credit
Year Of Age 62	Lower Point	Middle Range	Upper Point					
1979	180	905	1,085	1979	9.90%	1917	1979	3.00%
1980	194	977	1,171	1980	14.30%	1918	1980	3.00%
1981	211	1,063	1,274	1981	11.20%	1919	1981	3.00%
1982	230	1,158	1,388	1982	7.40%	1920	1982	3.00%
1983	254	1,274	1,528	1983	3.50%	1921	1983	3.00%
1984	267	1,345	1,612	1984	3.50%	1922	1984	3.00%
1985	280	1,411	1,691	1985	3.10%	1923	1985	3.00%
1986	297	1,493	1,790	1986	1.30%	1924	1986	3.00%
1987	310	1,556	1,866	1987	4.20%	1925	1987	3.50%
1988	319	1,603	1,922	1988	4.00%	1926	1988	3.50%
1989	339	1,705	2,044	1989	4.70%	1927	1989	4.00%
1990	356	1,789	2,145	1990	5.40%	1928	1990	4.00%
1991	370	1,860	2,230	1991	3.70%	1929	1991	4.50%
1992	387	1,946	2,333	1992	3.00%	1930	1992	4.50%
1993	401	2,019	2,420	1993	2.60%	1931	1993	5.00%
1994	422	2,123	2,545	1994	2.80%	1932	1994	5.00%
1995	426	2,141	2,567	1995	2.60%	1933	1995	5.50%
1996	437	2,198	2,635	1996	2.90%	1934	1996	5.50%
1997	455	2,286	2,741	1997	2.10%	1935	1997	6.00%
1998	477	2,398	2,875	1998	1.30%	1936	1998	6.00%
1999	505	2,538	3,043	1999	2.50%	1937	1999	6.50%
2000	531	2,671	3,202	2000	3.50%	1938	2000	6.50%
2001	561	2,820	3,381	2001	2.60%	1939	2001	7.00%
2002	592	2,975	3,567	2002	1.40%	1940	2002	7.00%
2003	606	3,047	3,653	2003	2.10%	1941	2003	7.50%
2004	612	3,077	3,689	2004	2.70%	1942	2004	7.50%
2005	627	3,152	3,779	2005	4.10%	1943	2005	8.00%
2006	656	3,299	3,955	2006	3.30%	1944	2006	8.00%
2007	680	3,420	4,100	2007	2.30%	1945	2007	8.00%
2008	711	3,577	4,288	2008	5.80%	1946	2008	8.00%
2009	743	3,739	4,482	2009	0.00%	1947	2009	8.00%
2010	761	3,825	4,586			1948	2010	8.00%

Table 10-3. FICA History

Year	FICA Wage Limit	Social Security Tax Rate	Social Security Tax	National Average Wage Index	Year	FICA Wage Limit	Social Security Tax Rate	Social Security Tax	National Average Wage Index
1951	3,600	1.50%	54.00	2,799.16	1984	37,800	5.40%	2,041.20	16,135.07
1952	3,600	1.50%	54.00	2,973.32	1985	39,600	5.40%	2,138.40	16,822.51
1953	3,600	1.50%	54.00	3,139.44	1986	42,000	5.70%	2,394.00	17,321.82
1954	3,600	2.00%	72.00	3,155.64	1987	43,800	5.70%	2,496.60	18,426.51
1955	4,200	2.00%	84.00	3,301.44	1988	45,000	5.70%	2,565.00	19,334.04
1956	4,200	2.00%	84.00	3,532.36	1989	48,000	6.06%	2,908.80	20,099.55
1957	4,200	2.25%	94.50	3,641.72	1990	51,300	6.06%	3,108.78	21,027.98
1958	4,200	2.25%	94.50	3,673.80	1991	53,400	6.20%	3,310.80	21,811.60
1959	4,800	2.50%	120.00	3,855.80	1992	55,500	6.20%	3,441.00	22,935.42
1960	4,800	3.00%	144.00	4,007.12	1993	57,600	6.20%	3,571.20	23,132.67
1961	4,800	3.00%	144.00	4,086.76	1994	60,600	6.20%	3,757.20	23,753.53
1962	4,800	3.13%	150.00	4,291.40	1995	61,200	6.20%	3,794.40	24,705.66
1963	4,800	3.63%	174.00	4,396.64	1996	62,700	6.20%	3,887.40	25,913.90
1964	4,800	3.63%	174.00	4,576.32	1997	65,400	6.20%	4,054.80	27,426.00
1965	4,800	3.63%	174.00	4,658.72	1998	68,400	6.20%	4,240.80	28,861.44
1966	6,600	3.90%	257.40	4,938.36	1999	72,600	6.20%	4,501.20	30,469.84
1967	6,600	3.90%	257.40	5,213.44	2000	76,200	6.20%	4,502.20	32,154.82
1968	7,800	3.90%	304.20	5,571.76	2001	80,400	6.20%	4,984.80	32,921.92
1969	7,800	4.20%	327.60	5,893.76	2002	84,900	6.20%	5,263.80	33,252.09
1970	7,800	4.20%	327.60	6,186.24	2003	87,000	6.20%	5,394.00	34,064.95
1971	7,800	4.60%	358.80	6,497.08	2004	87,900	6.20%	5,449.80	35,648.55
1972	9,000	4.60%	414.00	7,133.80	2005	90,000	6.20%	5,580.00	36,952.94
1973	10,800	4.85%	523.80	7,580.16	2006	94,200	6.20%	5,840.40	38,651.41
1974	13,200	4.95%	653.40	8,030.76	2007	97,500	6.20%	6,045.00	40,405.48
1975	14,100	4.95%	697.95	8,630.92	2008	102,000	6.20%	6,324.00	41,334.97
1976	15,300	4.95%	757.35	9,226.48	2009	106,800	6.20%	6,621.60	
1977	16,500	4.95%	816.75	9,779.44	2010	106,800	6.20%	6,621.60	
1978	17,700	4.95%	876.15	10,556.03					
1979	22,900	5.05%	1,156.45	11,479.46					
1980	25,900	5.08%	1,315.72	12,513.46					
1981	29,700	5.08%	1,508.76	13,773.10					
1982	32,400	5.35%	1,733.40	14,531.34					
1983	35,700	5.40%	1,927.80	15,239.24					

Table 10-4. Indexed Wages

	Retirement	62	Years	1	Months	Current Year	2010	
	Birth	1948		Age 62 Year	2010	Age 60 Year	2008	
Year	Age	FICA Wage Limit	Assumed Actual Wages	National Average Wages	Index Factor	Indexed Wages	Increasing Indexed Wages	
1970	22	7,800	7,800	6,186.24	6.68176	52,117.73	49,624.22	
1971	23	7,800	7,800	6,497.08	6.36208	49,624.22	52,117.73	
1972	24	9,000	9,000	7,133.80	5.79424	52,148.16	52,148.16	
1973	25	10,800	10,800	7,580.16	5.45305	58,892.94	58,892.94	
1974	26	13,200	13,200	8,030.76	5.14708	67,941.46	67,527.30	
1975	27	14,100	14,100	8,630.92	4.78917	67,527.30	67,941.46	1
1976	28	15,300	15,300	9,226.48	4.48004	68,544.61	68,544.61	2
1977	29	16,500	16,500	9,779.44	4.22672	69,740.88	69,309.13	3
1978	30	17,700	17,700	10,556.03	3.91577	69,309.13	69,740.88	4
1979	31	22,900	22,900	11,479.46	3.60078	82,457.86	82,457.86	5
1980	32	25,900	25,900	12,513.46	3.30324	85,553.92	85,553.92	6
1981	33	29,700	29,700	13,773.10	3.00114	89,133.86	89,133.86	7
1982	34	32,400	32,400	14,531.34	2.84454	92,163.10	92,163.10	8
1983	35	35,700	35,700	15,239.24	2.71240	96,832.68	96,207.30	9
1984	36	37,800	37,800	16,135.07	2.56181	96,836.42	96,832.68	10
1985	37	39,600	39,600	16,822.51	2.45712	97,301.95	96,836.42	11
1986	38	42,000	42,000	17,321.82	2.38629	100,224.18	97,301.95	12
1987	39	43,800	43,800	18,426.51	2.24323	98,253.47	97,955.10	13
1988	40	45,000	45,000	19,334.04	2.13794	96,207.30	97,961.80	14
1989	41	48,000	48,000	20,099.55	2.05651	98,712.48	98,253.47	15
1990	42	51,300	51,300	21,027.98	1.96571	100,840.92	98,488.43	16
1991	43	53,400	53,400	21,811.60	1.89509	101,197.81	98,567.61	17
1992	44	55,500	55,500	22,935.42	1.80223	100,023.77	98,712.48	18
1993	45	57,600	57,600	23,132.67	1.78687	102,923.71	99,742.50	19
1994	46	60,600	60,600	23,753.53	1.74016	105,453.70	100,012.14	20
1995	47	61,200	61,200	24,705.66	1.67310	102,393.72	100,023.77	21
1996	48	62,700	62,700	25,913.90	1.59509	100,012.14	100,224.18	22
1997	49	65,400	65,400	27,426.00	1.50715	98,567.61	100,672.20	23
1998	50	68,400	68,400	28,861.44	1.43219	97,961.80	100,740.31	24
1999	51	72,600	72,600	30,469.84	1.35659	98,488.43	100,840.92	25
2000	52	76,200	76,200	32,154.82	1.28550	97,955.10	100,946.22	26
2001	53	80,400	80,400	32,921.92	1.25555	100,946.22	101,197.81	27
2002	54	84,900	84,900	33,252.09	1.24308	105,537.49	101,920.93	28
2003	55	87,000	87,000	34,064.95	1.21342	105,567.54	102,000.00	29
2004	56	87,900	87,900	35,648.55	1.15951	101,920.93	102,393.72	30
2005	57	90,000	90,000	36,952.94	1.11858	100,672.20	102,923.71	31
2006	58	94,200	94,200	38,651.41	1.06943	100,740.31	105,453.70	32
2007	59	97,500	97,500	40,405.48	1.02300	99,742.50	105,537.49	33
2008	60	102,000	102,000	41,334.97	1.00000	102,000.00	105,567.54	34
2009	61	106,800	106,800		1.00000	106,800.00	106,800.00	35

Sum of 35 Greatest Indexed Earnings = 3,338,959

A.I.M.E. = 7,949

Table 10-5. Indexed Wages

Retirement		66		Years		Months		Current Year		2010	
Birth		1944		Age 62 Year		2006		Age 60 Year		2004	
Year	Age	FICA Wage Limit	Assumed Actual Wages	National Average Wages	Index Factor	Indexed Wages	Increasing Indexed Wages				
1966	22	6,600	6,600	4,938.36	7.21870	47,643.42	47,643.42				
1967	23	6,600	6,600	5,213.44	6.83782	45,129.61	45,129.61				
1968	24	7,800	7,800	5,571.76	6.39808	49,905.02	49,905.02				
1969	25	7,800	7,800	5,893.76	6.04852	47,178.46	47,178.46				
1970	26	7,800	7,800	6,186.24	5.76256	44,947.97	44,947.97				
1971	27	7,800	7,800	6,497.08	5.48686	42,797.51	42,797.51				
1972	28	9,000	9,000	7,133.80	4.99713	44,974.17	44,974.17				
1973	29	10,800	10,800	7,580.16	4.70288	50,791.10	50,791.10				
1974	30	13,200	13,200	8,030.76	4.43900	58,594.80	58,594.80				
1975	31	14,100	14,100	8,630.92	4.13033	58,237.65	58,237.65				1
1976	32	15,300	15,300	9,226.48	3.86372	59,114.92	59,114.92				2
1977	33	16,500	16,500	9,779.44	3.64525	60,146.63	60,146.63				3
1978	34	17,700	17,700	10,556.03	3.37708	59,774.32	59,774.32				4
1979	35	22,900	22,900	11,479.46	3.10542	71,114.12	71,114.12				5
1980	36	25,900	25,900	12,513.46	2.84882	73,784.44	73,784.44				6
1981	37	29,700	29,700	13,773.10	2.58827	76,871.62	76,871.62				7
1982	38	32,400	32,400	14,531.34	2.45322	79,484.33	79,484.33				8
1983	39	35,700	35,700	15,239.24	2.33926	83,511.58	83,511.58				9
1984	40	37,800	37,800	16,135.07	2.20938	83,514.56	83,514.56				10
1985	41	39,600	39,600	16,822.51	2.11910	83,916.36	83,916.36				11
1986	42	42,000	42,000	17,321.82	2.05801	86,436.42	86,436.42				12
1987	43	43,800	43,800	18,426.51	1.93463	84,736.79	84,736.79				13
1988	44	45,000	45,000	19,334.04	1.84382	82,971.90	82,971.90				14
1989	45	48,000	48,000	20,099.55	1.77360	85,132.80	85,132.80				15
1990	46	51,300	51,300	21,027.98	1.69529	86,968.38	86,968.38				16
1991	47	53,400	53,400	21,811.60	1.63438	87,275.89	87,275.89				17
1992	48	55,500	55,500	22,935.42	1.55430	86,263.65	86,263.65				18
1993	49	57,600	57,600	23,132.67	1.54105	88,764.48	88,764.48				19
1994	50	60,600	60,600	23,753.53	1.50077	90,946.66	90,946.66				20
1995	51	61,200	61,200	24,705.66	1.44293	88,307.32	88,307.32				21
1996	52	62,700	62,700	25,913.90	1.37565	86,253.26	86,253.26				22
1997	53	65,400	65,400	27,426.00	1.29981	85,007.57	85,007.57				23
1998	54	68,400	68,400	28,861.44	1.23516	84,484.94	84,484.94				24
1999	55	72,600	72,600	30,469.84	1.16996	84,939.10	84,939.10				25
2000	56	76,200	76,200	32,154.82	1.10865	84,479.13	84,479.13				26
2001	57	80,400	80,400	32,921.92	1.08282	87,058.73	87,058.73				27
2002	58	84,900	84,900	33,252.09	1.07207	91,018.74	91,018.74				28
2003	59	87,000	87,000	34,064.95	1.04649	91,044.63	91,044.63				29
2004	60	87,900	87,900	35,648.55	1.00000	87,900.00	87,900.00				30
2005	61	90,000	90,000	36,952.94	1.00000	90,000.00	90,000.00				31
2006	62	94,200	94,200	38,651.41	1.00000	94,200.00	94,200.00				32
2007	63	97,500	97,500	40,405.48	1.00000	97,500.00	97,500.00				33
2008	64	102,000	102,000	41,334.97	1.00000	102,000.00	102,000.00				34
2009	65	106,800	106,800		1.00000	106,800.00	106,800.00				35

Sum of 35 Greatest Indexed Earnings = 2,929,960

A.I.M.E. = 6,976

Table 10-6. Indexed Wages

	Retirement	70			Current Year	2010	
	Birth	1940		Age 62 Year	2002	Age 60 Year	2000
Year	Age	FICA Wage Limit	Assumed Actual Wages	National Average Wages	Index Factor	Indexed Wages	Increasing Indexed Wages
1962	22	4,800	4,800	4,291.40	7.49285	35,965.68	33,129.94
1963	23	4,800	4,800	4,396.64	7.31350	35,104.80	33,726.48
1964	24	4,800	4,800	4,576.32	7.02635	33,726.48	35,104.80
1965	25	4,800	4,800	4,658.72	6.90207	33,129.94	35,965.68
1966	26	6,600	6,600	4,938.36	6.51123	42,974.12	38,603.14
1967	27	6,600	6,600	5,213.44	6.16768	40,706.69	40,542.84
1968	28	7,800	7,800	5,571.76	5.77103	45,014.03	40,566.51
1969	29	7,800	7,800	5,893.76	5.45574	42,554.77	40,706.69
1970	30	7,800	7,800	6,186.24	5.19780	40,542.84	42,554.77
1971	31	7,800	7,800	6,497.08	4.94912	38,603.14	42,974.12
1972	32	9,000	9,000	7,133.80	4.50739	40,566.51	45,014.03
1973	33	10,800	10,800	7,580.16	4.24197	45,813.28	45,813.28
1974	34	13,200	13,200	8,030.76	4.00396	52,852.27	52,530.11
1975	35	14,100	14,100	8,630.92	3.72554	52,530.11	52,852.27
1976	36	15,300	15,300	9,226.48	3.48506	53,321.42	53,321.42
1977	37	16,500	16,500	9,779.44	3.28800	54,252.00	53,916.15
1978	38	17,700	17,700	10,556.03	3.04611	53,916.15	54,252.00
1979	39	22,900	22,900	11,479.46	2.80107	64,144.50	64,144.50
1980	40	25,900	25,900	12,513.46	2.56962	66,553.16	66,553.16
1981	41	29,700	29,700	13,773.10	2.33461	69,337.92	69,337.92
1982	42	32,400	32,400	14,531.34	2.21279	71,694.40	71,694.40
1983	43	35,700	35,700	15,239.24	2.11000	75,327.00	74,840.40
1984	44	37,800	37,800	16,135.07	1.99285	75,329.73	75,327.00
1985	45	39,600	39,600	16,822.51	1.91142	75,692.23	75,329.73
1986	46	42,000	42,000	17,321.82	1.85632	77,965.44	75,692.23
1987	47	43,800	43,800	18,426.51	1.74503	76,432.31	76,200.00
1988	48	45,000	45,000	19,334.04	1.66312	74,840.40	76,205.12
1989	49	48,000	48,000	20,099.55	1.59978	76,789.44	76,432.31
1990	50	51,300	51,300	21,027.98	1.52914	78,444.88	76,614.78
1991	51	53,400	53,400	21,811.60	1.47421	78,722.81	76,676.27
1992	52	55,500	55,500	22,935.42	1.40197	77,809.34	76,789.44
1993	53	57,600	57,600	23,132.67	1.39002	80,065.15	77,800.04
1994	54	60,600	60,600	23,753.53	1.35369	82,033.61	77,809.34
1995	55	61,200	61,200	24,705.66	1.30152	79,653.02	77,965.44
1996	56	62,700	62,700	25,913.90	1.24083	77,800.04	78,444.88
1997	57	65,400	65,400	27,426.00	1.17242	76,676.27	78,722.81
1998	58	68,400	68,400	28,861.44	1.11411	76,205.12	79,653.02
1999	59	72,600	72,600	30,469.84	1.05530	76,614.78	80,065.15
2000	60	76,200	76,200	32,154.82	1.00000	76,200.00	80,400.00
2001	61	80,400	80,400	32,921.92	1.00000	80,400.00	82,033.61
2002	62	84,900	84,900	33,252.09	1.00000	84,900.00	84,900.00
2003	63	87,000	87,000	34,064.95	1.00000	87,000.00	87,000.00
2004	64	87,900	87,900	35,648.55	1.00000	87,900.00	87,900.00
2005	65	90,000	90,000	36,952.94	1.00000	90,000.00	90,000.00
2006	66	94,200	94,200	38,651.41	1.00000	94,200.00	94,200.00
2007	67	97,500	97,500	40,405.48	1.00000	97,500.00	97,500.00
2008	68	102,000	102,000	41,334.97	1.00000	102,000.00	102,000.00
2009	69	106,800	106,800		1.00000	106,800.00	106,800.00

Sum of 35 Greatest Indexed Earnings = 2,709,373
A.I.M.E. = 6,450

ANSWERS

Set 10.1

1) 20.83%	3) 22.50%	5) 24.17%	7) 25.00%	9) 27.50%
11) 29.17%	13) 30.00%	15) 20.00%	17) 13.33%	19) 25.00%
21a) 6.25%	21b) 0.4688PIAw	23a) 10.42%	23b) 0.4479PIAw	
25a) 28.33%	25b) 0.3583PIAw			

Set 10.2

1) PIA = 2,048.10 Reduced PIA 1,544.61 Benefit = 1,544	3) PIA = 937.70 Reduced PIA 707.18 Benefit = 707	5) PIA = 2,262.70 Cola Increased 2,088.00 Benefit = 2,088
7) PIA = 1,770.90 Cola Increased 1,987.60 Benefit = 1,987	9) PIA = 2,015.20 Delayed PIA 2,176.50 Cola Increased 2,533.00 Benefit = 2,533	11) PIA = 1,956.00 Delayed PIA = 2,445.00 Cola Increased 2,987.70 Benefit 2,983
13) Benefit = 721	15) Benefit = 330	17) Benefit = 1,005
19) Benefit = 993	21) Benefit = 1,172	23) Benefit = 1,178
25) Age = 75 yrs, 10 months Revenue = \$312,500	27) Age = 79 yrs, 9 months Revenue = \$398,000	29) Age = 82 yrs, 3 months Revenue = \$870,700