**Spring 2017**

**ESI 5359**

**Industrial Financial Decisions**

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**Chapter 3 Homework**

**4. You need to have $50,000 at the end of 10 years. To accumulate this sum, you have decided to save a certain amount at the end of each of the next 10 years and deposit it in the bank. The bank pays 8 percent interest compounded annually for long-term deposits. How much will you have to save each year (to the nearest dollar**)?

=R()

R=()=$50,000/14.486=$3,452

That means I have to save $3,452 each year

**5. Same as Problem 4 above, except that you deposit a certain amount at the beginning of each of the next 10 years. Now, how much will you have to save each year (to the nearest dollar)?**

In this situation, R=()(1+0.08)]

R=$50,000/15.645=$3,196

**9. The H & L Bark Company is considering the purchase of a debarking machine that is expected to provide cash flows as follows:**

**END OF YEAR**

**1 2 3 4 5**

**Cash flow $1,200 $2,000 $2,400 $1,900 $1,600**

**6 7 8 9 10**

**Cash flow $1,400 $1,400 $1,400 $1,400 $1,400**

**If the appropriate annual discount rate is 14 percent, what is the present value of this cash-flow stream?**

=()=$1,200(0.877)=$1,052.40

=()=$2,000(0.769)=$1,538.00

=()=$2,400(0.675)=$1,620.00

=()=$1,900(0.592)=$1,124.80

=()=$1,600(0.519)=$830.40

=()=$1,400(0.456)=$638.40

=()=$1,400(0.400)=$560.00

=()=$1,400(0.351)=$491.40

=()=$1,400(0.308)=$431.20

=()=$1,400(0.270)=$378.00

Total PV is $8661.80

**14. Establish loan amortization schedules for the following loans to the nearest cent (see Table 3.8 for an example):**

**a. A 36-month loan of $8,000 with equal installment payments at the end of each month. The interest rate is 1 percent per month.**

**b. A 25-year mortgage loan of $184,000 at a 10 percent compound annual interest rate with equal installment payments at the end of each year.**

a. $8000=R=R(30.108)

R=$265.71

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| END  OF  YEAR | INSTALLMENT  PAYMENT | ANNUAL  INTEREST  x0.01 | PRINCIPAL  PAYMENT  (1)-(2) | PRINCIPAL  AMOUNT  OWING AT  YEAR END |
| 0 | - | - | - | $8,000.00 |
| 1 | $ 265.71 | $ 80.00 | $ 185.71 | 7,814.29 |
| 2 | 265.71 | 78.14 | 187.57 | 7,626.72 |
| 3 | 265.71 | 76.27 | 189.44 | 7,437.28 |
| 4 | 265.71 | 74.37 | 191.34 | 7,245.94 |
| 5 | 265.71 | 72.46 | 193.25 | 7,052.69 |
| 6 | 265.71 | 70.53 | 195.18 | 6,857.51 |
| 7 | 265.71 | 68.58 | 197.13 | 6,660.38 |
| 8 | 265.71 | 66.60 | 199.11 | 6,461.27 |
| 9 | 265.71 | 64.61 | 201.10 | 6,260.17 |
| 10 | 265.71 | 62.60 | 203.11 | 6,057.06 |
| 11 | 265.71 | 60.57 | 205.14 | 5,851.92 |
| 12 | 265.71 | 58.52 | 207.19 | 5,644.73 |
| 13 | 265.71 | 56.44 | 209.27 | 5,435.46 |
| 14 | 265.71 | 54.35 | 211.36 | 5,224.10 |
| 15 | 265.71 | 52.24 | 213.47 | 5,010.63 |
| 16 | 265.71 | 50.11 | 215.60 | 4,795.03 |
| 17 | 265.71 | 47.95 | 217.76 | 4,577.27 |
| 18 | 265.71 | 45.77 | 219.94 | 4,357.33 |
| 19 | 265.71 | 43.57 | 222.14 | 4,135.19 |
| 20 | 265.71 | 41.35 | 224.36 | 3,910.83 |
| 21 | 265.71 | 39.11 | 226.60 | 3,684.23 |
| 22 | 265.71 | 36.84 | 228.87 | 3,455.36 |
| 23 | 265.71 | 34.55 | 231.16 | 3,224.20 |
| 24 | 265.71 | 32.24 | 233.47 | 2,990.73 |
| 25 | 265.71 | 29.91 | 235.80 | 2,754.93 |
| 26 | 265.71 | 27.55 | 238.16 | 2,516.77 |
| 27 | 265.71 | 25.17 | 240.54 | 2,276.23 |
| 28 | 265.71 | 22.76 | 242.95 | 2,033.28 |
| 29 | 265.71 | 20.33 | 245.38 | 1,787.90 |
| 30 | 265.71 | 17.88 | 247.83 | 1,540.07 |
| 31 | 265.71 | 15.40 | 250.31 | 1,289.76 |
| 32 | 265.71 | 12.90 | 252.81 | 1,036.95 |
| 33 | 265.71 | 10.37 | 255.34 | 781.61 |
| 34 | 265.71 | 7.82 | 257.89 | 523.72 |
| 35 | 265.71 | 5.24 | 260.47 | 263.25 |
| 36 | 265.88 | 2.63 | 263.25 | 0.00 |
|  | **$9,565.73** | **$1,565.73** | **$8,000.00** |  |

b. $184,00=R()=R(9.077)

R=$20,271.01

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| END  OF  YEAR | INSTALLMENT  PAYMENT | ANNUAL  INTEREST  x0.01 | PRINCIPAL  PAYMENT  (1)-(2) | PRINCIPAL  AMOUNT  OWING AT  YEAR END |
| 0 | - | - | - | $184,000.00 |
| 1 | $ 20,271.01 | $18,400.00 | $1,871.01 | 182,128,99 |
| 2 | 20,271.01 | 18,212.90 | 2,058.11 | 180,070.88 |
| 3 | 20,271.01 | 18,007.09 | 2,263.92 | 177,806.96 |
| 4 | 20,271.01 | 17,780.70 | 2,490.31 | 175,316.65 |
| 5 | 20,271.01 | 17,531.67 | 2,739.34 | 172,577.31 |
| 6 | 20,271.01 | 17,257.73 | 3,013.28 | 169,564.03 |
| 7 | 20,271.01 | 16,956.40 | 3,314.61 | 166,249.42 |
| 8 | 20,271.01 | 16,624.94 | 3,646.07 | 162,603.35 |
| 9 | 20,271.01 | 16,260.34 | 4,010.67 | 158,592.68 |
| 10 | 20,271.01 | 15,859.27 | 4,411.74 | 154,180.94 |
| 11 | 20,271.01 | 15,418.09 | 4,852.92 | 149,328.02 |
| 12 | 20,271.01 | 14,932.80 | 5,338.21 | 143,989.81 |
| 13 | 20,271.01 | 14,398.98 | 5,872.03 | 138,117.78 |
| 14 | 20,271.01 | 13,811.78 | 6,459.23 | 131,658.55 |
| 15 | 20,271.01 | 13,165.86 | 7,105.15 | 124,553.40 |
| 16 | 20,271.01 | 12,455.34 | 7,815.67 | 116,737.73 |
| 17 | 20,271.01 | 11,673.77 | 8,597.24 | 108,140.49 |
| 18 | 20,271.01 | 10,814.05 | 9,456.96 | 98,683.53 |
| 19 | 20,271.01 | 9,868.35 | 10,402.66 | 88,280.87 |
| 20 | 20,271.01 | 8,828.09 | 11,442.92 | 76,837.95 |
| 21 | 20,271.01 | 7,683.80 | 12,587.21 | 64,250.74 |
| 22 | 20,271.01 | 6,425.07 | 13,845.94 | 50,404.80 |
| 23 | 20,271.01 | 5,040.48 | 15,230.53 | 35,174.27 |
| 24 | 20,271.01 | 3,517.43 | 16,753.58 | 18,420.69 |
| 25 | 20,262.76 | 1,842.07 | 18,420.69 | 0.00 |
|  | $506.767.00 | $322.767.00 | $184,000.00 |  |

**15. You have borrowed $14,300 at a compound annual interest rate of 15 percent. You feel that you will be able to make annual payments of $3,000 per year on your loan. (Payments include both principal and interest.) How long will it be before the loan is entirely paid off (to the nearest year)?**

$14,300=$3,000()

=$14,300/$3,000=4.767

TABLE IV shows when i=15%, PVFIA= 4.767, the n almost to 9 years

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**17. Earl E. Bird has decided to start saving for his retirement. Beginning on his twenty-first birthday, Earl plans to invest $2,000 each birthday into a savings investment earning a 7 percent compound annual rate of interest. He will continue this savings program for a total of 10 years and then stop making payments. But his savings will continue to com- pound at 7 percent for 35 more years, until Earl retires at age 65. Ivana Waite also plans to invest $2,000 a year, on each birthday, at 7 percent, and will do so for a total of 35 years. However, she will not begin her contributions until her thirty-first birthday. How much will Earl’s and Ivana’s savings programs be worth at the retirement age of 65? Who is better off financially at retirement, and by how much?**

Earl’s plan: FV=$2,000()()

=$2,000x(13.816)(10.677)=$295.027

Ivana’s plan: FV=$2,000)

=$2,000(138.237)=$276.474

$295.027-$276.474=$18,553

Earl’s plan is better, this plan will get $18,553 more.

**20. Suppose that an investment promises to pay a nominal 9.6 percent annual rate of inter-est. What is the effective annual interest rate on this investment assuming that interest is compounded (a) annually? (b) semiannually? (c) quarterly? (d) monthly? (e) daily (365 days)? (f) continuously? (Note: Report your answers accurate to four decimal places – e.g., 0.0987 or 9.87%.)**

Formula 3.21 effective annual interest rate = (1 + [i /m]) m – 1

a. annually =(1+[0.096/1])1-1=0.0960

b. semiannually=(1+[0.096/2])2)-1=0.0983

c. quarterly =(1+[0.096/4])4-1=0.0995

d. monthly= (1+[0.096/12])12-1=0.1003

e. daily=(1+[0.096/365]365-1=0.1007

**22. It took roughly 14 years for the Dow Jones Average of 30 Industrial Stocks to go from 1,000 to 2,000. To double from 2,000 to 4,000 took only 8 years, and to go from 4,000 to 8,000 required roughly 2 years. To the nearest whole percent, what compound annual growth rates are implicit in these three index-doubling milestones?**

a. 72/14=5% b.72/8=9% c.72/2=36%