

Exam 2
Engineering Economy
Spring, 2010
Answers

1. A large bank that was trying to attract new customers started a program wherein a person starting a checking account could borrow up to \$10,000 at an interest rate of 10% per year simple interest for up to 5 years. A person who borrows the maximum amount for the maximum time would owe how much money at the end of the 5 year period. (Factor notation only)

Answer: $F = \$15,000$

2. About how long would it take for \$1000 to accumulate to \$8000 at an interest rate of 9% per year?

Answer: 24 years

3. Sun Oil Company is considering the installation of new flow meters in one of its pipelines. If the company goes ahead with the project, it will spend \$50,000 each year for four years starting 2 years from now. What is the present worth of the investment at an interest rate of 10% per year? (Factor notation only)

Answer: $P = \$50000(P/A, 10\%, 4)(P/F, 10\%, 1)$

4. An engineer wants to have \$80,000 available for a new car 5 years from now. How much must he invest each year if he starts 2 years from now and he earns 10% per year. Assume the money is to be available immediately after the last deposit. (Factor notation only)

Answer: $A = \$80000(A/F, 10\%, 4)$

5. In order to expand its product lines, a manufacturer is planning to increase the size of its warehouse. To finance it, the company will borrow \$100,000 three years from now. If the company wants to repay the loan with 5 equal payments, starting one year after he gets the loan, what must be the size of each one at an interest rate of 10% per year? (Factor notation only)

Answer: $A = \$100000(A/P, 10\%, 5)$

6. If a person deposits \$5,000 per year for five years beginning four years from now, how much will be in the account 15 years from now if the account earns interest at 10% per year? (Factor notation only)

Answer: $F = \$5000(F/A, 10\%, 5)(F/P, 10\%, 7)$

7. A series of payment of \$2,000 for three years beginning in year 4 would be equivalent to how much in year 15 at an interest rate of 10%? (factor notation only)

Answer: $F = \$2000(F/A, 10\%, 3)(F/P, 10\%, 9)$

8. What is the present worth in year 0 of a uniform series of payments of \$1,000 in years 3 through 6 and another series of \$2000 payments in years 7 through 12 at an interest rate of 10% per year? (Factor notation only)

Answer: $P = \$1000(P/A, 10\%, 4)(P/F, 10\%, 2) + \$2000(P/A, 10\%, 6)(P/F, 10\%, 6)$

9. The present worth of \$400 in year 1 and amounts increasing by \$30 per year through year 6 at an interest rate of 10% per year is how much? (Factor notation only)

Answer: $P = \$400(P/A, 10\%, 6) + 30(P/G, 10\%, 6)$

10. John Deere expects the cost of a certain tractor part to increase by \$5 /yr beginning 4 years from now. If the cost in years 1-3 is \$60, the present worth of the cost thru year 10 at an interest rate of 12%/yr is how much? (Factor notation equation only)

Answer: $P = [60(P/A, 12\%, 8) + 5(P/G, 12\%, 8)](P/F, 12\%, 2) + 60(P/A, 12\%, 2)$

11. For an interest rate of 12% per year compounded quarterly, the nominal rate per six months is how much?

Answer: 6%

12. For an interest rate of 12% per year, compounded quarterly, the effective interest per six months is how much? (Equation only)

Answer: $i/6 \text{ mos.} = (1+0.06/2)^2 - 1$

13. For an interest rate of 10% per year, compounded semiannually, the effective rate for 2 years is how much? (Equation only)

$r/2 \text{ years} = 0.05 \times 4 = 0.20$

Answer: $i/2 \text{ years} = (1+0.20/4)^4 - 1$

14. What is the effective interest rate when payments of \$1000 per six months are made for 5 years starting 6 months from now at an interest rate of 10% per year compounded continuously? (Equation only)

Answer: $i/6 \text{ mos.} = e^{0.05} - 1$

15. How much money will be accumulated in 5 years from a deposit of \$500 every month if the interest rate is 1.5% per month? (Factor Notation only)

Answer: $F = \$500(F/A, 1.5\%, 60)$

16. An economic analysis of four mutually exclusive revenue projects yielded the results shown below. Which one(s) should be selected?

A = -\$10,000 Answer: None

B = -\$7000

C = -\$15000

D = -\$8000

17. What is the capitalized cost of a machine with a first cost of \$200,000 and \$10,000 annual cost at an interest rate of 10%?

Answer: $\text{Cap Cost} = -\$200,000 - \$10,000/0.10 = -\$300,000$

18. What is the annual worth of an asset that has a first cost of \$10,000, an annual operating cost of \$1,000, and a salvage cost of \$6,000 after 3 years at 10% interest? (Factor Notation only)

Answer: $A = -\$10,000(A/P, 10\%, 3) - \$1,000 - \$6,000(A/F, 10\%, 3)$

19. Write the general rate of return equation.

Answer: $0 = -P \pm A(P/A, i, n) \pm F(P/F, i, n)$

20. A \$20,000 bond with interest at 6% per year, payable semiannually is due in 20 years. The PW of the bond at 10% per year compounded semiannually is nearest to: (Factor Notation only)

Answer: $I = (20000)(0.06)/2 = \$600$ every 6 months
 $P = \$600(P/A, 5\%, 40) \pm \$20,000(P/F, 5\%, 40)$