

Exam #1- Engineering Economy  
Spring, 2010

Name: ANSWERS

Id#(last 4 digits)\_\_\_\_\_

1. If \$10,000 is borrowed at an interest rate of 10% per year, determine the amount of money that is owed at the end of 5 years if the interest is simple.

Answer: \$15,000

2. American Airlines estimates that unpainted airplanes use less fuel because of less weight to the extent of \$10,000 per year per plane. How much could the company afford to spend now to strip the paint from an airplane if it expects to recover its investment in 6 years at an interest rate of 10%. (Factor Notation Only).

Answer:  $P = \$10000(P/A, 10\%, 6)$

3. Wendy's International has received a bid of \$10,000 to re-coat a parking lot with a water sealer and repaint the parking-space lines. What is the equivalent annual cost of the job if the company expects to recover its investment in 5 years at an annual interest rate of 10%? (Factor Notation Only)

Answer:  $A = \$10000(A/P, 10\%, 5)$

4. A large bank that was trying to attract new customers started a program wherein a person starting a checking account could borrow up to \$5,000 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:  $F = \$7500$

5. About how long would it take for \$1000 to accumulate to \$8000 at an interest rate of 12% per year?

Answer: 18 years

6. How much money could a start-up software company afford to borrow now if it promises to repay the loan with six equal year-end payments of \$1,000 if the interest rate is 10% per year. (factor notation only)

Answer:  $P = \$1000(P/A, 10\%, 6)$

7. Coronado Golf Course installed a new irrigation system that uses reclaimed sewage for watering the fairways. The cost of the irrigation system was \$500,000. If the club expects to recover its investment in 5 years using an interest rate of 10% per year, the annual savings in water cost would be how much? (factor notation only)

Answer:  $A = \$500000(A/P, 10\%, 5)$

8. An elastomeric roofing material can be installed on a parts warehouse for \$2,000. If the company expects to recover its investment in 5 years through reduced energy costs, the required annual savings at an interest rate of 10% per year is how much? (Factor notation only)

Answer:  $A = \$2000(A/P, 10\%, 5)$

9. How much should a company be willing to pay a contractor who claims he has a device which will reduce the company's energy bill by at least \$5,000 per year? Assume the company wants to recover its investment in 4 years at an interest rate of 10%. (Factor notation only)

Answer:  $P = \$5000(P/A, 10\%, 4)$

10. 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 3 years from now. What is the present worth of the investment at an interest rate of 10% per year? (Factor notation only)

Answer:  $P = \$50000(P/A, 10\%, 4) (P/F, 10\%, 2)$

11. An engineer working for a DSL provider expects to earn bonuses of \$5000 per year for 6 years, beginning 2 years from now. If the engineer invests the money at 10% per year how much will she have in the account immediately after she makes the last deposit? (Factor notation only)

Answer:  $F = \$5000(F/A, 10\%, 6)$

12. An engineer wants to have \$80,000 available for a new car 6 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:  $A = \$80000(A/F, 10\%, 5)$

13. 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 two 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:  $A = \$100000(A/P, 10\%, 5)$

14. If a person deposits \$5,000 per year for five years beginning four years from now, how much will be in the account 17 years from now if the account earns interest at 10% per year? (Factor notation only)

Answer:  $F = \$5000(F/A, 10\%, 5)(F/P, 10\%, 9)$

15. For the series of deposits shown below, how much would be in the account in year 15 if the account earns 10% per year? (Factor notation only)

<u>Years</u>	<u>Deposit/year</u>	<b>Credit was given because it is incorrectly worded problem</b>
5-9	\$2000	
5-10	\$0	
10-15	\$3000	Answer: <u><math>F = \\$2000(F/A, 10\%, 4)(F/P, 10\%, 11) + \\$3000(F/A, 10\%, 6)</math></u>

16. A series of payment of \$2,000 for three years beginning in year 4 would be equivalent to how much in year 14 at an interest rate of 10%? (factor notation only)

Answer:  $F = \$2000(F/A, 10\%, 3)(F/P, 10\%, 8)$

17. What is the present worth in year 0 of a uniform series of payments of \$1,000 in years 2 through 5 and another series of \$2000 payments in years 8 through 12 at an interest rate of 10% per year? (Factor notation only)

Answer:  $P = \$1000(P/A, 10\%, 4)(P/F, 10\%, 1) + \$2000(P/A, 10\%, 5)(P/F, 10\%, 7)$

18. A small company wants to make a single deposit now so it will have enough money to purchase a new truck costing \$40,000 four years from now. If the account will earn interest of 10% per year, the amount that must be deposited in how much? (Factor notation only)

Answer:  $P = \$40000(P/F, 10\%, 4)$

19. An engineer made a modification to a chip manufacturing process which will save \$5000 per year. At an interest rate of 10% per year, how much would the savings amount to in 6 years? (Factor notation only)

Answer:  $F = \$5000(F/A, 10\%, 6)$

20. The present worth of \$400 in year 1 and amounts increasing by \$30 per year through year 5 at an interest rate of 10% per year is how much? (Factor notation only)

Answer:  $P = \$400(P/A, 10\%, 5) + 30(P/G, 10\%, 5)$

**BONUS: 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:  $P = 60(P/A, 12\%, 8) + 5(P/G, 12\%, 8)(P/F, 12\%, 2) + 60(P/A, 12\%, 2)$

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Years      Deposit/year      **Credit was given because problem was incorrectly worded.**

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5-11      \$0

10-15      \$3000      Answer:  $F = \$2000(F/A, 10\%, 4)(F/P, 10\%, 11) + \$3000(F/A, 10\%, 6)$

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