

SUPPLEMENTARY PROBLEMS

1) Linear Depreciation

- i) A new office building is now worth \$1 million dollars. It depreciates linearly over a 50 year period. What will its value be in 10 years?
ANS. \$800,000.
- ii) An automobile is purchased for \$24,000. It depreciates linearly and after 5 years it is worth nothing. After how many years will it be worth \$9,600?
ANS. 3 years.
- iii) A new item is worth \$84,000. It depreciates linearly and after 5 years it is worth \$24,000. How many years will it take for the item to be worthless?
ANS. 7 years.

2) Decision Analysis

A product may be made using 2 processes. Under the first process, the cost function is $C_1(x) = 15x + 18,000$. Under the second process, the cost function is

$C_2(x) = 20x + 15,000$. (Note: x represents the number of units produced.)

The product sells for \$50 each. Which process should be used to maximize profit

- if:
- i) projected sales are 450 units?
 - ii) projected sales are 510 units?
 - iii) projected sales are 650 units?

ANS. Second process is better for $x = 450, 510$

First process is better for $x = 650$

3) Compound Interest (time and rate problems)

- i) Suppose \$20,000 is invested at a rate of 4% compounded semi-annually. How many years will it take for the investment to be worth \$24,379.89?
ANS. 5 years.
- ii) Suppose \$50,000 is invested at a certain interest rate. The rate is compounded 3 times a year for 10 years. If, at the end of the 10 years, the investment is worth \$67,392.45, what was the rate?
ANS. 3%.

4) **Annuities** (time problems)

- i) You make quarterly deposits of \$1,500 in a plan. The rate is 4% per year compounded quarterly. When you close out the plan you withdraw \$122,504.51. For how many years did you have the plan?
ANS. 15 years.
- ii) You have a lump sum of \$13,734.91. You withdraw \$800 twice a year for a certain number of years. The rate is 3% compounded semi-annually. How many years will it be before the lump sum is exhausted?
ANS. 10 years.

5) **Investment Analysis**

- i) Jim has \$150,000 in his account. He transfers this amount to a new account which earns 8% per year compounded quarterly. In addition he deposits \$3000 in this account each quarter until he retires in 20 years. How much will there be in the account when he retires?
ANS. \$1,312,631.75
- ii) From age 25 to 40 Mark deposited \$200 at the end of each month into a retirement account. He made no further deposits or withdrawals. The accumulated amount then earned 6% compounded monthly until he retired at 65. Susan deposited \$300 monthly from age 40 to 65. If both Marks's and Susan's deposits earned 6% compounded monthly, who had the better nest egg at 65? How much better?
ANS. Mark by \$51,801.16