

## Problem 1. (20 points)

For each of the following economic computations, (a) list the conversion factor to be used, specifying the parameter values, and (b) compute the result, showing your work. Write your answers on the blank lines on the right edge of this page; correct answers in other locations may not receive full credit. An example is provided.

**EXAMPLE:**

If you invest \$100 in a bank account today, at an interest rate of 6.5%, how much will you have after five years?

(a) (F/P, 6.5%, 5)

(b) \$ 137.01

$$100 * (F/P, 6.5\%, 5) = 100 * (1 + 0.065)^5 = 100 * 1.3701 = 137.01$$

A. (5 points) Your company currently leases a piece of machinery for \$650/month. Assuming the owner increases the lease rate 4.5% each year, what will be the monthly lease price 10 years from now?

(a) (F/P, 4.5%, 10)

(b) \$ 1009.43

$$650 (F/P, 4.5\%, 10) = 650 (1.045)^{10}$$

$$= 650 (1.553) = 1009.43$$

B. (5 points) New manufacturing equipment will cost \$475,000. Assuming a desired rate of return of 15% and a lifetime of 20 years, what is the minimum annual savings needed to justify this investment?

(a) (A/P, 15%, 20)

(b) \$ 75886.70

$$475000 (A/P, 15\%, 20) = 475000 \left( \frac{.15 (1.15)^{20}}{(1.15)^{20} - 1} \right)$$

$$= 475000 (.1598) = 75886.70$$

C. (5 points) You will need \$30,000 five years from now for a down payment on a house. Assuming your investments earn 7.3%, how much do you need to invest annually to achieve this goal?

(a) (A/F, 7.3%, 5)

(b) \$ 5185.59

$$30000 (A/F, 7.3\%, 5) = 30000 \left( \frac{.073}{(1.073)^5 - 1} \right)$$

$$= 30000 (.1729) = 5185.59$$

D. (5 points) A bond with a discount (interest) rate of 8.5% costs \$18,785 today. What is the term (in years) required for this bond to reach its face value of \$50,000?

(a) (P/F, 8.5%, n)

(b) 12

$$18785 = P = 50000 (P/F, 8.5\%, n)$$

$$18785 = 50000 (1.085)^{-n}$$

$$(1.085)^n = 50000/18785 = 2.6617$$

$$n \log (1.085) = \log (2.6617)$$

$$n = 12$$

## Problem 2. (10 points)

Your company is considering the purchase of a piece of machinery, which it will use for four years and then sell to someone else. Compute each of values requested below. Show your work, including equations, and enter the results in the table below. If you need more space, use the back of **this sheet**.

Throughout this problem assume an interest rate of 6%. A table of conversion factors is provided below.

Table of Conversion Factors

(F/P, 6%, 4) =	1.2625
(P/F, 6%, 4) =	0.7921
(A/F, 6%, 4) =	0.2286
(F/A, 6%, 4) =	4.3746
(A/P, 6%, 4) =	0.2886
(P/A, 6%, 4) =	3.4651
(P/G, 6%, 4) =	4.9455

		Present Value
Initial Purchase Price	\$135,000	\$135,000
Salvage Value	Part A below	64952.20
Operating/Maintenance Costs	Part B below	41820.35
NET COST		\$111,868.15
Expected Mfg Cost Savings	Part D below	\$138604

- A. (2 points) After using this equipment for four years, your company expects to sell it for \$82,000. What is the present value of the salvage price?

$$82000 (P/F, 6\%, 4) = 82000 (.7921) = 64952.20$$

- B. (3 points) Operating and maintenance costs are estimated at \$9500 in the first year, with an increase of \$1800 in each subsequent year. What is the present value of operating and maintenance costs for the four-year period?

$$\begin{aligned} & 9500 (P/A, 6\%, 4) + 1800 (P/G, 6\%, 4) \\ &= 9500 (3.4651) + 1800 (4.9455) \\ &= 32918.45 + 8901.90 = 41820.35 \end{aligned}$$

- C. (2 points) Taking into account all of these factors (purchase price, salvage value, operating and maintenance costs), what is the net cost (present value) of this machinery over the entire four years of use?

$$\begin{aligned} & 135000 - 64952.20 + 41820.35 \\ &= 111868.15 \end{aligned}$$

- D. (2 points) This equipment is expected to yield \$40,000 savings in manufacturing costs each year. What is the present value of the expected savings for the four years of use?

$$\begin{aligned} & 40000 (P/A, 6\%, 4) = 40000 (3.4651) \\ &= 138604 \end{aligned}$$

- E. (1 point) Do you consider purchasing this equipment to be a good investment? Briefly justify your answer.

YES - SAVINGS EXCEED COST.

NO - ANNUAL RETURN OF ~ 6% ON INVESTMENT OF OVER \$100K.