# Assignment 3

## EECE/CPEN 481

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Selected problems listed below are based on textbook problems or directly drawn from the textbook (Engineering Economic Analysis: Fourth Canadian Edition).

Problems are drawn mainly from material in Chapters 6 and 7.

1. Problem 1 (2 pts )
2. Problem 2 (1 pts)
3. Problem 3 (1 pts)
4. Problem 4 (1.5 pts)
5. Problem 5 (1.5 pts)
6. Problem 6 (2 pts)

# Assignment 3

1. **Problem 1**

Anna, an engineer, has made a considerable fortune. She wishes to start a scholarship for engineering students at her alma mater. The scholarship will provide a student with an annual stipend of $16,500 for each of four years, plus an additional $12,000 during the fourth year to cover job search expenses. Assume that students graduate in four years, and all funds are paid at the beginning of the year (so, the first award will be given at the beginning of Year 1). Assume an interest rate of 3%. Round all answers to the nearest dollar.

a) Determine the equivalent uniform annual cost (EUAC) of providing the scholarship.

b) Suppose that the payment structure will change slightly: all scholarship payments will take place at the end of the year. The interest rate remains the same. How much money must Anna donate to the university, rounded to the nearest dollar? (Assume her donation is made in year 0.)

c) Suppose, under the conditions listed in part (b), that Anna would like to donate an amount of money that will allow the program to continue forever (in perpetuity). How much would she need to donate in year 0 for this to be possible?

2. **Problem 2**

A company must decide whether to buy Machine A or Machine B:

| | **Machine A** | **Machine B** |
|---|---|---|
| Initial cost | $13,300 | $24,000 |
| Useful life, in years | 4 | 10 |
| End-of useful-life salvage value | $10,000 | $7,500 |
| Annual maintenance | $1,000 | $0 |

At a 6% interest rate, use an annual cash flow analysis to analyze each option. Which machine should be installed?

3. **Problem 3**

Your cousin Jeremy has asked you to bankroll his proposed business painting houses. He plans to operate the business for five years to pay his way through college. He needs $14,000 to buy an old pickup truck, some ladders, a paint sprayer, and some other equipment. Assume you would loan him the money in year 0. He is promising to pay you $3,100 at the end of each year (for five years) in return for this investment. Calculate your annual rate of return, rounded to the nearest tenth of a percent.

4. **Problem 4**

Danielle can purchase a municipal bond with a par value (list price) of $12,000 that will mature in five years. The bond pays 4.2% interest. Payments are issued quarterly. If she can buy this bond for $10,800, what effective annual rate of return will she earn, rounded to the nearest tenth of a percent?

5. **Problem 5**

Some laboratory equipment sells for $100,000. The manufacturer offers two options:

(1) borrow $75,000 of the cost and repay it with annual payments over four years at 5.5% interest. Pay the rest with cash right away.
(2) Pay it all immediately with cash, in which case the manufacturer will lower the price by 5%.

What is the effective annual interest rate you would pay if you pay by financing, rounded to the nearest tenth of a percent?

6. **Problem 6**

Consider three alternatives: A, B, and do nothing. Construct a choice table for these alternatives.

| Year | A | B |
|---|---|---|
| 0 | -$110 | -$165 |
| 1 | +32 | +45 |
| 2 | +32 | +45 |
| 3 | +32 | +45 |
| 4 | +32 | +45 |
| 5 | +32 | +45 |