

# **Assignment 1**

**EECE/CPEN 481**

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Selected problems from the textbook (Engineering Economic Analysis: Fourth Canadian Edition).

Problems are drawn mainly from material in Chapters 1 and 3.

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

### 1. Problem 1

A pump has failed in a facility that will be completely replaced in three years. One option would be to buy a new brass pump; it would cost \$6,000 (including installation cost), and would last three years. However, a used stainless-steel pump that should last three more years has been sitting in the maintenance shop for a year. The used pump cost \$13,000 when it was new. The accountants say the pump is now worth \$7,000. The maintenance supervisor says that it would cost \$1,800 to reconfigure the pump for the new use. He also says he could instead sell it used (as is) for \$3,500.

- (a) What is the net benefit or net cost of installing the stainless-steel pump? Of installing the brass pump?
- (b) Which option is better?
- (c) What is the opportunity cost for this set of options?
- (d) How much cheaper or more expensive would it be to use the stainless-steel pump rather than a new brass pump?

### 2. Problem 2

Five years ago, when the relevant cost index was 110, a nuclear centrifuge cost \$11,000,000. The centrifuge had a capacity of separating 5 litres of ionized solution per second. Today, a centrifuge with a capacity of 6.4 litres per second is needed, but the cost index now is 180. Assuming a power-sizing exponent to reflect economies of scale,  $x$ , of 0.72, use the power-sizing model to determine the approximate cost of the new reactor (expressed in today's dollars, rounded to the nearest hundred thousand dollars).

### 3. Problem 3

In your own words explain the time value of money. From your own life (either now or in a situation that might occur in the future), give two examples of how the time value of money would be important.

### 4. Problem 4

You will receive an inheritance of \$250,000, but you don't know when. The interest rate for the time value of money (the discount rate) is 3.5%. How much is the inheritance worth now, rounded to the nearest dollar, if it will be received:

- (a) In 5 years?
- (b) In 10 years?
- (c) In 20 years?
- (d) In 50 years?

### 5. Problem 5

A student decides to buy a used ukulele. If they paid for it now, it would cost \$85. However, the student is short on cash so instead agrees to pay \$110 for it 6 months from now when they will have the cash.

- (a) Assuming semi-annual (every 6 months) compounding, what is the nominal annual interest rate they will be paying for deferring payment?
- (b) What is the effective annual interest rate?

Round both final answers to the nearest percent.