Assignment 5

EECE/CPEN 481

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Selected problems covering material on measuring environmental benefits, inflation, and price changes, drawing in part on material from the textbook (Engineering Economic Analysis: Fourth Canadian Edition).

Problems are drawn from lecture materials and Chapter 9.

Point values for the problems are listed below.

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

Assignment 5

1. **Problem 1**

What methods might you use for estimating the value of the benefits for each of the following? In each case, give two examples of methods that could apply, and describe the steps involved for that exact situation. In each case, give one example of a method that would NOT work well, and describe why.

(a) An hour of reduced commuting time
(b) The conversion of 15 kilometers of unused railway tracks near a city of 300,000 into a new bike path
(c) A reduction in annual flood risks from the Mississippi River for St. Louis by 5%
(d) The creation of a new national park in the Okanagan region of BC
(e) Saving a human life

2. **Problem 2**

A private firm has a $200,000 capital budget for new investments in its factory.
(a) Using the analysis method most commonly used by private firms, determine which project(s) should be funded.
(b) Determine the opportunity cost of capital.

Project	Capital cost	Annual benefits	Life (years)	Salvage value
A	$100,000	$19,500	5	$12,000
B	$100,000	$20,000	10	$5,000
C	$100,000	$17,000	7	$8,000
D	$100,000	$16,500	8	$15,000

3. **Problem 3**

Chips USA is considering the following projects to improve its production process. Chips uses a three-year horizon for evaluation.

(a) If Chips has a budget of $70,000, which projects should be done?
(b) What is the opportunity cost of capital?

Project	Initial Cost	Uniform Annual Benefit
1	$25,000	$12,800
2	30,000	14,000
3	14,000	7,000
4	5,000	2,400
5	22,000	10,000
6	15,000	8,500
7	30,000	16,000

4. Problem 4

Ten capital spending proposals have been made to the budget committee as the members prepare the annual budget for their firm. Each independent project has a five-year life and no salvage value.

Project	Initial Cost ($ thousands)	Uniform Annual Benefit ($ thousands)	Computed Rate of Return (%)
A	$10	$3.1	16.6
B	25	7.9	17.5
C	5	1.5	15.2
D	10	3.2	18.0
E	20	5.5	11.6
F	30	9.8	18.9
G	16	4.5	12.6
H	10	3.8	26.1
I	5	1.8	23.4
J	15	5.0	19.9

(a) On the basis of a MARR value of 13%, which projects should be considered further?
(b) For each option, calculate the Net Present Worth, and the ratio of NPW to the Present Worth of the cost (both rounded to 2 decimal places).
(c) Rank-order all the projects in order of desirability, using the ratio calculated above.
(d) If only $85,000 is available to invest for initial costs, which projects should be approved?