

IE 342 18-19 Spring Semester

Study Set 4

Please note that we will not send the solution key! But you can ask your questions in the office hour.

1) The owner of a business is considering investing \$60,000 in new equipment. He estimates that the net cash flows will be \$5,000 during the first year, but will increase by \$2,500 per year the next year and each year thereafter. The equipment is estimated to have a 10-year service life and a net salvage value of \$10,000 at that time. The firm's interest rate is 12%.

- a) Determine the annual capital cost (ownership cost) for the equipment.
- b) Determine the equivalent annual savings (revenues).
- c) Determine whether this is a wise investment.

2) Consider four investments with the following sequences of cash flows:

n	A	B	C	D
0	-\$20000	-\$30000	-\$20000	-\$32000
1	\$28000	\$33000	\$10000	\$15000
2	\$22000	\$33000	\$5000	\$25000
3	\$10000	-\$25000	\$3000	\$0

- a) Identify all the simple investments
- b) Identify all the non-simple investments.
- c) Compute i^* for each investment.

3) Bilkent University wants to buy a new turning machine for machine labs. There are two options:

Option 1:

Purchasing cost=\$50,000, Operating Cost=\$6,000, Salvage Value=\$20,000, Lifetime: 3 years

Option 2:

Purchasing cost=\$62,000, Operating Cost=\$5,000, Salvage Value=\$30,000, Lifetime: 5 years

Given that this machine will be used indefinitely (i.e. required service period is infinity), and price of the machine and related costs will not change, which option should be chosen at MARR=12%?

4) Ankara Municipality has built the tallest ferris wheel in the world for \$100,000,000 and it has a useful life of 20 years. Operating cost of the ferris wheel for each year is \$10,000 and

the salvage value at the end of the 20th year is \$10,000,000. In the first year, they obtained \$800,000, and revenue increases 5% each year. If MARR=10%

- a. Find AE(10%).
- b. Suppose that 900,000 people visits each year, what is the profit obtained per visitor?

5) An automobile that runs on electricity can be purchased for \$20,000. The automobile is estimated to have a life of 12 years with annual travel of 25,000 miles. Every 3 years, a new set of batteries will have to be purchased at a cost of \$2,000. Annual maintenance of the vehicle is estimated to cost \$600. The cost of recharging the batteries is estimated at \$0.015 per mile. The salvage value of the batteries and the vehicle at the end of 12 years is estimated to be \$1,000. Suppose the MARR is 6%. What is the cost per mile to own and operate this vehicle, based on the preceding estimates?

6) Consider the investment projects given in the table:

n	A	B	C
0	-\$100	-\$200	-\$100
1	\$470	\$100	\$300
2	\$720	\$200	\$250
3	-\$360	\$260	-\$40

- a) By using the sign rule, find the number of possible i 's for each project.
- b) Apply Accumulated Sign Flow Test and find the projects with a unique positive i^* .
- c) Compute the value of i for each project.

7) A retail company is reviewing ways of cutting the cost of stocking raw materials. Two new stockless systems are being considered, to decrease the company's holding and handling costs. Relevant financial data for each system as follows (dollar values are in millions):

	Current Practice	Just-in-Time System	Stockless Supply System
Start-up cost	\$0.0	\$2.5	\$5.0
Annual stock holding cost	\$3.0	\$1.4	\$0.2
Annual operating cost	\$2	\$2	\$1
System life	8 years	8 years	8 years

If the company's MARR is 15%, which system is more economical?

8) Consider the two mutually exclusive investments projects in table below, which have unequal service lives.

Project's Cash Flow

Year	A		B	
	Cash Flow	Salvage Value	Cash Flow	Salvage Value
0	-\$35,000		-\$22,000	
1	-\$3,000		-\$2,500	
2	-\$3,000		-\$2,500	
3	-\$3,000		-\$2,500	\$4,500
4	-\$3,000			
5	-\$3,000	\$2,500		

Both projects A and B will be available (or can be repeated) with the same costs and salvage values. Assuming an infinite planning horizon:

- On the basis of the NPW criterion, which project is a better choice at MARR = 10%?
- On the basis Annual worth Analysis, which project is a better choice at MARR = 10%?