

IE 342 18-19 Spring Semester

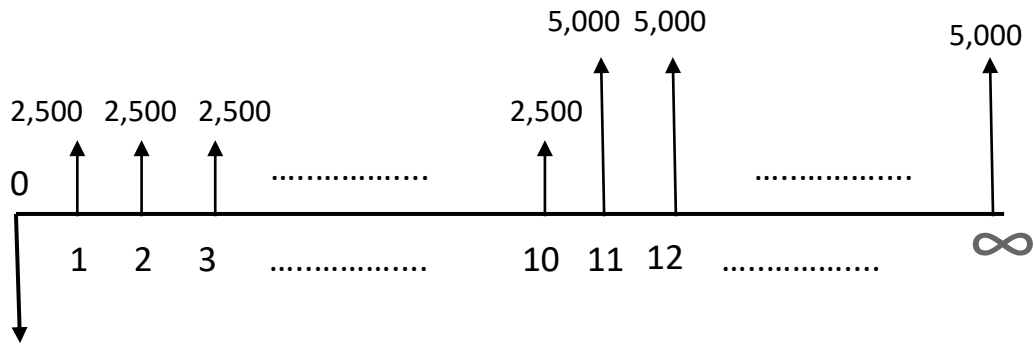
Study Set 3

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

- 1) A production facility is planning to buy an enterprise resource planning software. The implementation and training costs will result in a total of \$120,000 at the end of the first year. Following year it will generate a profit of \$45,000, and continuing \$50,000, \$55,000, \$60,000 respectively. If $MARR=15\%$. What is the net present worth of this 5 year project?
- 2) A new bus terminal will have a construction cost of \$200,000. The terminal will need a renovation every 10 years at a cost of \$50,000. Annual maintenance costs will be \$15,000. The is considered as $MARR=9\%$.
 - a) What is the capitalized cost of the bus terminal
 - b) Because of bad weather conditions the terminal will need a renovation every 8 years. What would be the capitalized cost in that case
 - c) How would the results change if $MARR=15\%$, how does the rate affect the results
- 3) Consider the following cash flow: Zeynep earns \$1,000 in year 1, \$1,100 in year 2, \$1,200 in year 3, \$1,300 in year 4, and the same pattern continues up to infinity. (\$1,000 in year 5, \$1,100 in year 6, \$1,200 in year 7,...). What is the present worth of this cash flow under $MARR=10\%$?
- 5) Two methods of carrying away surface runoff water from a new subdivision are being evaluated.

Method A. Dig a ditch. The first cost would be \$55,000 and \$35,000 of redigging and shaping would be required at five-year intervals forever.
Method B. Lay concrete pipe. The first cost would be \$90,000, and a replacement would be required at 50-year intervals at a net cost of \$120,000 forever.

At $MARR = 12\%$, which method is better?
- 6) The owner of a business is considering investing \$77,000 in new equipment. He estimates that the net cash flows will be \$7,000 during the first year, but will increase by \$1,500 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 11%.
 - 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.
- 7) Given that $i = 13\%$ and payment period is infinite, find the present worth value of following cash flow.



8) Consider the following cash flows:

Projects' Cash Flows

n	A	B	C
0	-\$4,200	-\$10,000	-\$6,000
1	\$800	\$2,000	\$1,700
2	\$800	\$3,500	\$1,700
3	\$800	\$2,500	\$1,700
4	\$800	\$2,500	\$1,700
5	\$800	\$2,500	\$1,200
6	\$800	\$2,000	\$1,200
7	\$800		\$1,200
8	\$800		

- Calculate the (conventional) payback period for each project.
- Calculate the discounted payback period for each project assuming $i = 10\%$

9) A third wave coffee shop considers replacing their old coffee machine with a new one due to its high maintenance costs. The new coffee machine costs \$30,000 including the installation cost and it will require maintenance and repair every 2 years at a cost of \$6,000. In addition, an expenditure of \$8,000 will need to be made at the end of the third year for a caffeine extraction mechanism for the customers who prefer decaf coffee which will not be available until then. Annual operating costs are expected to be around \$1,000 for the first 5 years and \$1,500 thereafter. Compute the capitalized equivalent assuming $i=5\%$.

10) A newly constructed bridge costs \$3,000,000. The same bridge is estimated to need renovation every 10 years at a cost of \$500,000. Annual repairs and maintenance are expected to cost \$100,000 in a year.

- a) Determine the capitalized cost of the bridge assuming $i=7\%$.
- b) Suppose that the bridge turns out to be requiring renovation every 8 years, not every 10 years. What is the capitalized cost of the bridge?

11) Suppose that X Company wants to install a new inspection system. There are two options given by two different companies: Option 1: Purchasing Cost=\$20,000, Operating Cost=\$6,000, Salvage Value=\$4,000, Option 2: Purchasing Cost=\$32,000, Operating Cost=\$5,000, Salvage Value=\$5,000, Given that the chosen inspection system will be used 5 years, which model should be chosen at $MARR=12\%$ using present worth analysis?

12) Consider the investment projects below, all of which have a four-year investment life:

n	A	B	C	D
0	-\$2500	-\$100	-\$1800	-\$2000
1	\$100	0	\$200	\$400
2	\$100	0	\$1200	\$500
3	-\$100	\$200	-\$1300	\$600
4	\$50	\$100	0	\$700

Compute the net present worth of each project at $i=10\%$