

IE 342 Study Set 4

Fall 2016

Do not submit your solutions as they will not be graded!

Q1) The cash flows for a certain project are as given in the table below. Find the equivalent annual worth for this project at $i=10\%$, and determine the acceptability of the project.

n	Investment	Operating Income	
0	-\$2000	0	1 st cycle
1	0	\$1500	
2	0	\$700	
3	-\$2000	\$500	2 nd cycle
4	0	\$1500	
5	0	\$700	
6	-\$2000	\$500	3 rd cycle
7	0	\$1500	
8	0	\$700	
9	0	\$500	

Q2) Beginning next year, a foundation will support an annual seminar on campus by the earnings of a \$150,000 gift it is received this year. It is felt that 8% interest will be realized for the first 10 years, but that plans should be made to anticipate an interest rate of 6% after that time. What amount should be added to the foundation now to fund the seminar at the \$20,000 level into infinity?

Q3) You are considering investing \$55,000 in new equipment. You estimate 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 \$6,000 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.

Q4) You are considering a luxury apartment building project that requires an investment of \$12,500,000. The building has 50 units. You expect the maintenance cost for the apartment building to be \$250,000 the first year and \$300,000 the second year. The maintenance cost will continue to increase by \$50,000 in subsequent years. The cost to hire a manager for the building is estimated to be \$80,000 per year. After five years of operation, the apartment building can be sold for \$14,000,000. What is the annual rent per apartment unit that will provide a return on investment of 15%? Assume that the building will remain fully occupied during its five years of operation.

Q5) Company X has been contracting its overhauling work to Company Y for \$40,000 per machine per year. Company X estimates that by building a \$500,000 maintenance facility with a life of 15 years and a salvage value of \$100,000 at the end of its life. It could handle its own overhauling at a cost of only \$30,000 per machine per year. What is the minimum annual number of machines that Company X must operate to make it economically feasible to build its own facility? Assume an interest rate of 12%.

Q6) An airplane company is considering the purchase of a helicopter for connecting services between the company's base airport and the new inter county airport being built about 30 miles away. It is believed that the chopper will be needed only for 6 years until the transit connection is phased in. The estimates on two types of helicopters under consideration, The Whirl 2B and The ROT 8, are given in table below.

	The Whirl 2B	The ROT 8
First cost	\$95,000	\$120,000
Annual maintenance	\$3,000	\$9,000
Salvage value	\$12,000	\$25,000
Useful life in years	3	6

Assuming that the Whirl 2B will be available in the future with identical costs, what is the annual cost advantage of selecting the Whirl 2B? Use an interest rate of 10%.

Q7) Fulton National Hospital is reviewing ways of cutting the cost of stocking medical supplies. Two new stockless systems are being considered, to lower the hospital's holding and handling costs. The hospital's industrial engineer has compiled the relevant financial data for each system as follows (dollar values are in millions):

	Current System	Just-In-Time System	Stockless Supply System
Startup cost	0	\$2.5	\$5
Annual stock holding cost	\$3	\$1.4	0.2
Annual operating cost	\$2	\$1.5	\$1.2
System life	8	8	8

The system life of eight years represents the period that the contract with the medical suppliers is in force. If the hospital's MARR is 10%, which system is more economical?

Q8) You wish to sell a bond that has a face value of \$1,000. The bond bears an interest rate of 7%, which is payable semiannually. Four years ago, the bond was purchased at \$940. At least an 8% annual return on the investment is desired. What must be minimum selling price of the bond now in order to make the desired return on the investment?

Q9) In 1970, Wal-Mart offered 300,000 shares of its common stock to the public at a price of \$16.50 per share. Since that time, Wal-Mart has had 11 two-for-one stock splits. On a purchase of 100 shares at \$16.50 per share on the company's first offering, the number of shares has grown to 205,200 shares worth \$10,963,400 in January, 2010. What is the return on investment for investors who purchased the

stock in 1970 (over a 40-year ownership period)? Assume that no dividends were received during that period.

Q10) Consider four investments with the following sequences of cash flows:

n	Project A	Project B	Project C	Project D
0	-\$18,000	-\$30,000	\$34,578	-\$56,500
1	\$30,000	\$32,000	-\$18,000	\$2,500
2	\$20,000	\$32,000	-\$18,000	\$6,459
3	\$10,000	-\$22,000	-\$18,000	-\$78,345

- Identify all the simple investments.
- Identify all the nonsimple investments.
- Compute i^* for each investment.
- Which project has no rate of return?

Q11) Consider an investment project with the following cash flows:

n	Net Cash Flow
0	-\$120,000
1	\$94,000
2	\$144,000
3	\$72,000

- Find the IRR for this investment.
- On the basis of the IRR criterion, should the project be accepted at $MARR = 15\%$?

Q12) Consider the following investment projects:

n	Project 1	Project 2	Project 3
0	-\$1,600	-\$5,000	-\$1,000
1	\$10,000	\$10,000	\$4,000
2	\$10,000	\$30,000	-\$4,000
3		-\$40,000	

Assume that $MARR=12\%$ in the following questions:

- Identify i^* (s) the for each investment. If the project has more than one i^* , identify all of them.
- Which project(s) is (are) a mixed investment?
- Compute the IRR for each project.
- Determine the acceptability of each project.

Q13)Recent technology has made possible a computerized vending machine that can grind coffee beans and brew fresh coffee on demand. The computer also makes possible such complicated functions as changing \$5 and \$10 bills, tracking the age of an item, and moving the oldest stock to the front of the line, thus cutting down on spoilage. With a price tag of \$4,500 for each unit, Easy Snack has estimated the cash flows in millions of dollars over the product's six-year useful life, including the initial investment, as given in the table below.

n	Net Cash Flow
0	-\$30
1	\$9
2	\$18
3	\$20
4	\$18
5	\$10
6	\$5

- On the basis of the IRR criterion, if the firm's MARR is 18%, is this product worth marketing?
- If the required investment remains unchanged, but the future cash flows are expected to be 10% higher than the original estimates, how much of an increase in IRR do you expect?
- If the required investment has increased from \$30 million to \$35 million, but the expected future cash flows are projected to be 10% smaller than the original estimates, how much of a decrease in IRR do you expect?

Q14)Hewlett Electronics manufactures amplified pressure transducers. It must decide between two machines for a finishing operation. Select one for them on the basis of IRR criterion. The company's MARR is 18% per year.

	Variable speed	Dual Speed
Investment	\$270,000	\$360,000
Annual Operating Cost	\$120,000	\$100,000
Salvage Value	\$80,000	\$90,000
Useful life	8 years	8 years