

IE 342 STUDY SET 2

SUMMER 2019

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

- 1) Suppose that a municipality wants to establish a cleaning facility to clean the river. There are two options given by two different companies:

Option 1:

Equipment Cost=\$75,200, Operating Cost=\$6,800/year, Salvage Value=\$21,000, Lifetime=6 years

Option 2:

Equipment Cost=\$44,000, Operating Cost=\$11,500/year, Salvage Value=\$0, Lifetime=6 years

Assuming the projects are repeatable, which model should be chosen at MARR=13% using present worth analysis?

Answer: Option 2.

- 2) Meryem wants to buy a coffee shop that will cost \$80,000. She will make a down payment of \$10,000 and take out a mortgage on the rest of the amount at 9% compounded monthly.
- a) What will be her monthly payments to pay off the mortgage in 20 years?
 - b) Meryem has made 28 monthly payments and wants to figure out the remaining balance immediately after the 28th payment. What is that balance?

Answer:

a) \$630

b) \$66,768.30

- 3) A company is selling stocks at a price of 82 TL per share at the end of year 2018. The expected dividend in 2018 is 4 TL and the dividend payments are expected to increase by 2.5% for five years (increases by 2.5% in each year). The expected stock price in 5 years will be 101 TL per share. You expect 9% on your investment. By considering 5 years only, would you buy the stock or not? Why?

Answer: Buy the stock

- 4) Mr. Smith wants to buy a new caravan that will cost \$26,000. He will make a down payment in the amount of \$10,430. He would like to borrow the remainder from a bank at an interest rate of 12% compounded monthly. He agrees to pay off the loan monthly for a period of three years.
- a) What is the amount of monthly payment?
 - b) What is the balance remaining immediately after 18th payment? What is the interest and principal payments of the 18th payment?

Answer:

a) \$517.15

b) \$8,480.36, \$89.08, \$428.07

- 5) A car company is advertising a 24-month lease of a car for \$520/month. The lease requires a \$2,500 down payment paid today and a \$400 disposition fee paid at the end of the lease. As an alternative, the company offers a 24-month lease with a single up-front payment of \$12,780, plus a \$500 refundable security deposit. The security deposit will be refunded (as \$500) at the end of the 24-month lease. Assuming an interest rate of 6%, compounded monthly, which lease is more preferable? **Answer: Option 2**

- 6) Tahani wants to sell a bond that has a face value of \$1,000. The bond has a coupon rate of 6% payable semiannually. Five years ago, he paid \$880 for the bond. She requires at least a 8% return on this investment. What must be the minimum selling price?

Answer: \$942.47

- 7) A technology company issued a new series of bonds on January 1, 2010. The bonds were at par (\$1,000), have a 12% coupon rate and mature in 30 years in December 31, 2039. Coupon interest payments are made semiannually on June 30 and December 31.

- What was the yield to maturity of the bond on January 1, 2010?
- Assuming that market interest rate on bonds had fallen to 9%, what was the price of the bond on January 1, 2015?
- On July 1, 2015, the bonds sold for \$922.38. What was the yield to maturity at that date?
- What was the current yield on that date?

Answer:

- effective annual interest rate = 12.36 %**
- \$1296.43**
- effective annual interest rate = 13.488 %**
- effective annual yield = 13.43 %**

- 8) A newly constructed bridge costs \$15,000,000. The same bridge is estimated to need renovation every 15 years at a cost of \$3,000,000. Annual repairs and maintenance are estimated to be \$1,000,000 a year.

- If the interest rate is 5%, determine the capitalized cost of bridge.
- Suppose that in (a), the bridge must be renovated every 20 years, not every 15 years. What is the capitalized cost of the bridge?
- Repeat (a) and (b) with an interest rate of 10%. What can you say about the effect of interest on the results?

Answer:

- \$37,780,537.26**
- \$36,814,555.23**
- \$25,944,213.31 / \$25,523,788.74**

- 9) You are head of the production department at one of the leading truck manufacturing companies in Turkey. In order to satisfy demand and deliver orders within lead time, the company needs to increase production capacity. After long discussions with engineers in the department, the decision to purchase new machine with larger capacity is made. However, there are only two options, Machine A and Machine B, and you need to select one of them as soon as possible to start production.

- Machine A: Purchasing price 100000TL, service life 5 years, salvage value 24000 TL, annual operating cost 8000 TL, extra income taxes 2500 TL per year.
- Machine B: Purchasing price 65500TL, service life 6 years, salvage value is negligible, annual operating cost 12000 TL.

Which machine will you decide to purchase using annual worth analysis? Interest rate is 12%. You will need the machine indefinitely and do not expect to have its price and operating costs to change significantly in the future.

Answer: B (Annual Worth Analysis: -27,929.6 > -34,462.4)

10) Suppose that a company needs to provide paving service to the municipality for the next 5 years. There are two different types of pavers available for this purpose:

Option 1: Equipment Cost=\$600,000,

Operating Cost=\$300,000/year,

Salvage Value=\$400,000 in year 1, decreases by 25% each year of use,

Lifetime=3 years

Option 2: Equipment Cost=\$900,000,

Operating Cost=\$120,000/year,

Salvage Value=\$650,000 in year 1, decreases by 20% each year of use,

Lifetime=6 years

Assuming the projects are repeatable, which model should be chosen at MARR=11% using present worth analysis? What would be your decision if you used annual worth analysis?

Answer: Option 2 (-320,782 > 488,378.5 Annual Worth Analysis)