

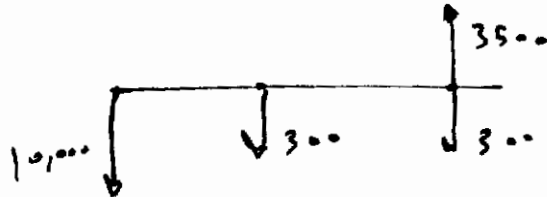
Chapter 12 Homework Solution

10)

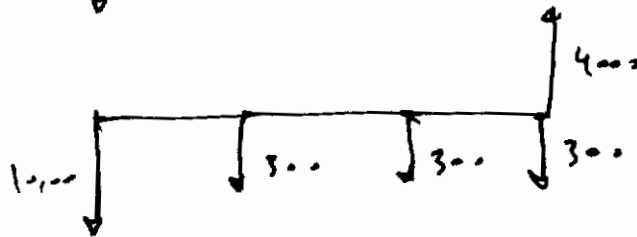
$M = 1$



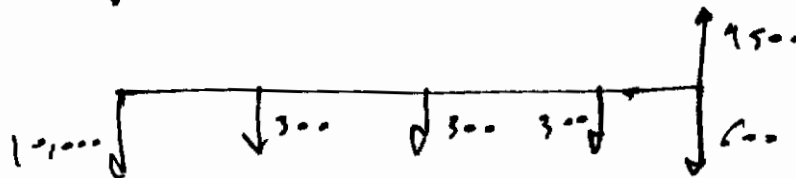
$M = 2$



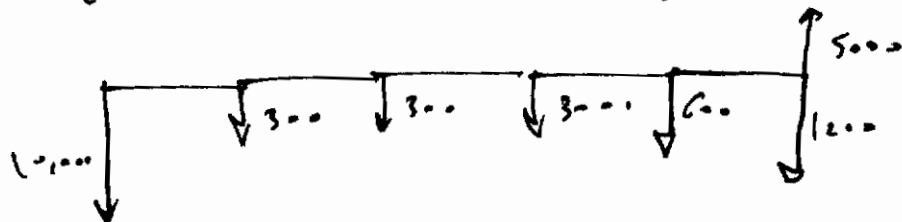
$M = 3$



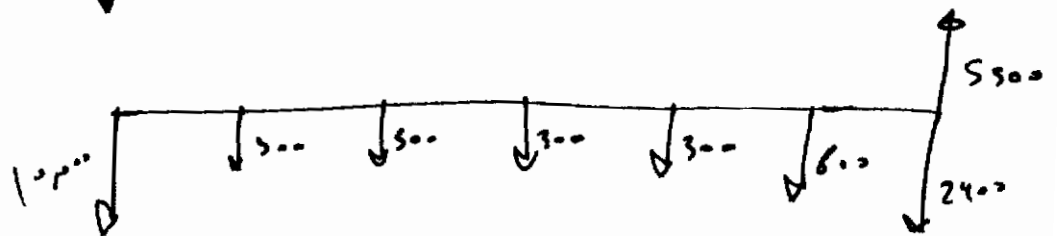
$M = 4$



$M = 5$



$M = 6$



$$EUAC(1) = 10,000 (A|P, 15\%) + 3,000 - 3,000 = 8800$$

$$EUAC(2) = 10,000 (A|P, 15\%, 2) + 3,000 - 3,500 (A|F, 15\%, 2) = 4823$$

$$EUAC(3) = 10,000 (A|P, 15\%, 3) + 3,000 - 4,000 (A|F, 15\%, 3) = 3528$$

$$EUAC(4) = 10,000 (A|P, 15\%, 4) + 3,000 - 4,200 (A|F, 15\%, 4) = 2962$$

$$\boxed{EUAC(5) = 2733} \text{ } EUAC_{\text{Min}}$$

(11)

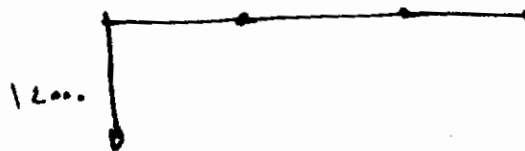
$m=1$



$m=2$



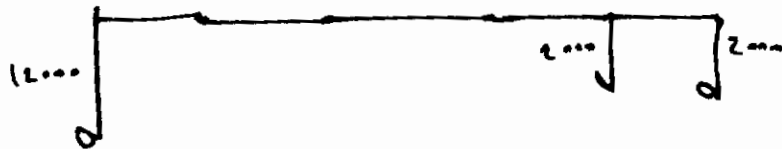
$m=3$



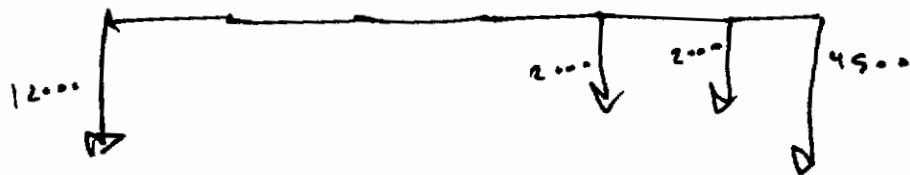
$m=4$



$m=5$



$m=6$



m	EUAC
1	13200
2	6914
3	4825
4	4219
5	3929
6	4099

EUAC min

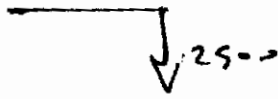
Economic life

is 5 years

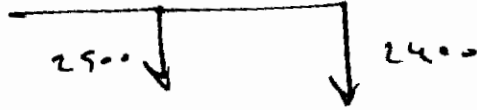
(22)

Defender cash flows over the remaining years.

$n=1$



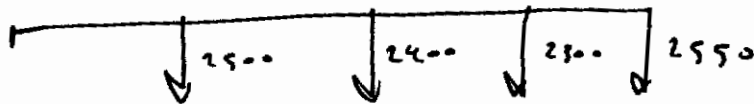
$n=2$



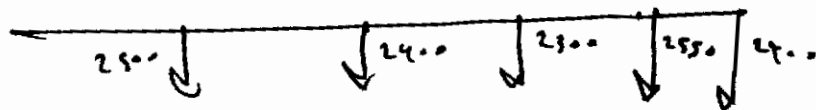
$n=3$



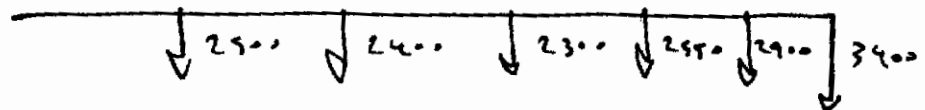
$n=4$



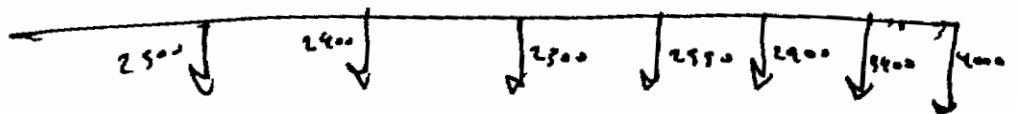
$n=5$



$n=6$



$n=7$



$$i = 10\%$$

(3)

EUAC for defender.

n	EUAC
1	2500
2	2452
3	2370 *
4	2408

a) $EUAC_{min}$ for defender = $\sqrt{\$2370}$

b) $EUAC_{min}$ for challenger = $\sqrt{\$2600}$

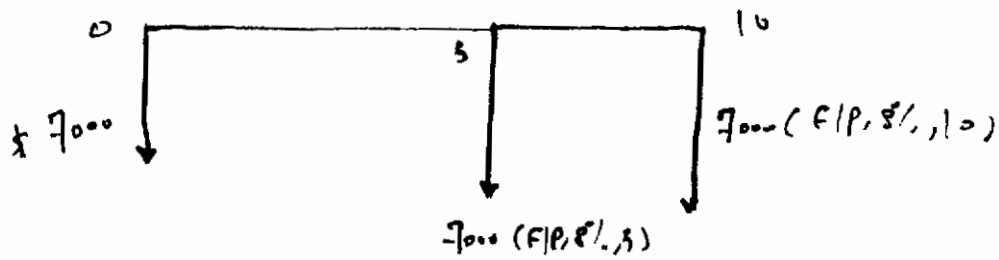
c) Keep the defender, as long as the
Marginal cost < 2600 .

So keep it for 4 Extra years.

chapter 14 (homework solution)

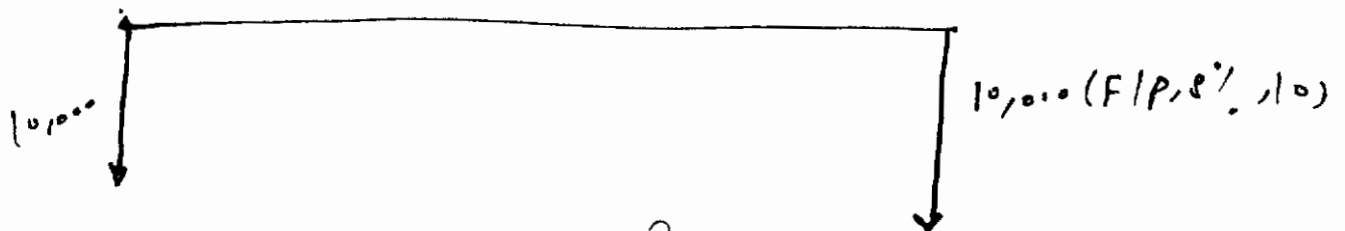
13) Fuel rating 8 years = $10 (F|P, 12\%, 8) = 24.76 \text{ Km/Liter.}$

25)



Filtaco cash flow

$$\begin{aligned} PW_C(\text{Filtaco}) &= 7000 + 7000 (F|P, 8\%, 5) (P|F, 20\%, 5) \\ &\quad + 7000 (F|P, 8\%, 10) (P|F, 20\%, 10) \\ &= 7000 [1 + (1.469)(0.409) + (2.199)(0.1619)] \\ &= \boxed{\$14,061} \end{aligned}$$

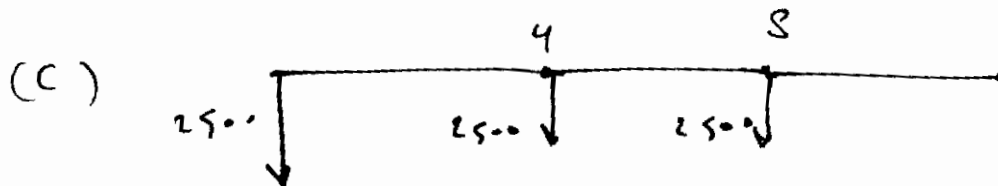
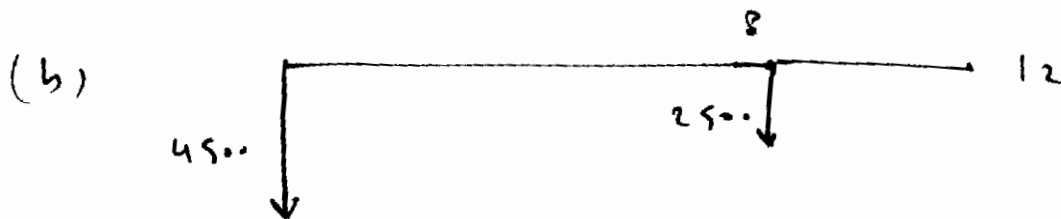


DURO cash flow

$$\begin{aligned} PW_C(\text{DURO}) &= 10,000 [1 + (F|P, 8\%, 10) (P|F, 20\%, 10)] \\ &= 10,000 [1 + (2.159)(0.1619)] \\ &= \boxed{\$13,487} \end{aligned}$$

Decision: purchase the Duro unit.

33) part (a) costs of minor overflows remain listed.



$$PWC(a) = 6000$$

$$PWC(b) = 4500 + 2500 (P/F, 8\%, 8)$$

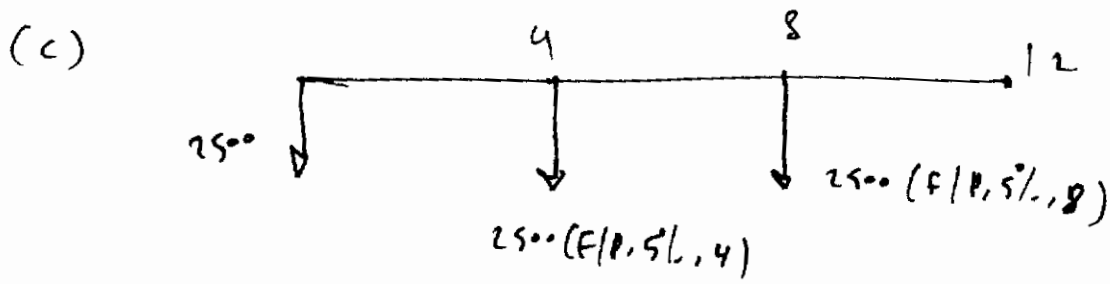
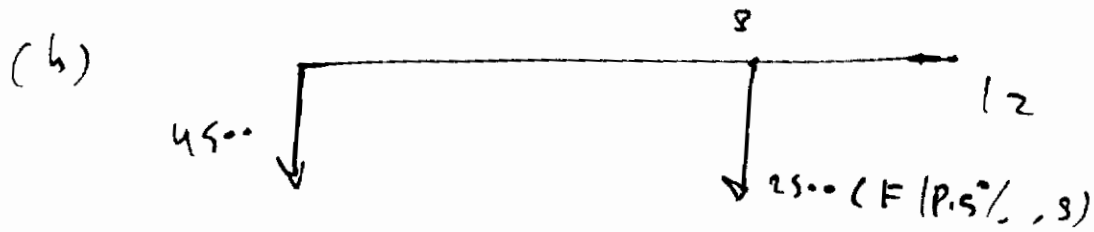
$$= \boxed{\$ 5850.75}$$

$$PWC(c) = 2500 [1 + (P/F, 8\%, 4) + (P/F, 8\%, 8)]$$

$$= \boxed{\$ 5525.75}$$

\Rightarrow (c) is the best selection.

part (h): Costs of Minor overhauls increase at 5% pa year.



$$pwc(a) = \$6000$$

$$pwc(b) = 4500 + 2500 (F/P, 5\%, 8) (P/F, 8\%, 8)$$

$$= \$6495$$

$$pwc(c) = 2500 [1 + (F/P, 5\%, 4) (P/F, 8\%, 4)$$

$$+ (F/P, 5\%, 8) (P/F, 8\%, 8)]$$

$$= \$6729$$

(a) is the best selection.

FACULTY OF ENGINEERING & ARCHITECTURE
AMERICAN UNIVERSITY OF BEIRUT
FINAL
FALL 06-07

Instructors: Nizam, Noueihed, and Trabulsi
(ENMG 400) Engineering Economy
Open Book and Notes (2 Hrs.)
The Question Sheet Must Be Returned With the Booklet

January 25, 2007

1. (25%)

The cost of new and more efficient electrical circuit switching equipment is \$180,000. It is estimated that the equipment will reduce the net operating expenses by \$36,000 per year over the next 10 years. It will have a \$30,000 market value at the end of the 10th year. All the previous amounts are in constant dollars. The inflation rate is estimated to be 8 percent over the next 10 years. Due to new computer control features on the equipment, it will be necessary to contract for some maintenance support during the first three years only. The maintenance contract will cost \$2,800 per year in current money. This equipment will be depreciated under the MACRS-GDS method, and it is in the five-year property class. The effective income tax rate is 38 percent. The selected analysis period is 10 years and the after-tax MARR is 15 percent per year.

- a- Based on an actual dollar after -tax analysis, is this capital investment justified, use the PW method?
- b- Develop the ATCF in real dollars and find the PW of the investment and compare your answer with previous question (a).

2. (25%)

Two mutually exclusive alternative investment projects are being considered with the following data:

	Investment A	Investment B
First cost	\$10,000	\$9,000
Annual benefits	2500	2200
Useful life	5 years	5 years

Both investments will be depreciated using the straight-line method over their useful lives with no salvage value. Assume that the cash flows are in current dollars, and the company is in the 40 percent incremental tax bracket and uses an after-tax MARR of 15 percent. Use the Benefit-Cost ratio analysis to determine, if any, which of the investments is more economically attractive.

3. (20%)

A Eurobond has been offered by the Lebanese government in the market with a Face Value (Maturity Value) of \$10,000 and a maturity of 5 years. It pays a coupon every quarter at a rate (interest) of 10 percent per year, compounded quarterly.

It was purchased by an investor at time 0 at a price of \$9,814. At the end of year 4 and in anticipation of a rise in interest rate, its owner sold it for \$8,076.

- a) What was the effective annual rate of return on this investment?
- b) How do you assess such investment, if the investor's MARR was 8 percent per year, compounded monthly?

4. (30%)

An asset purchased by a machine tool company 12 years ago for \$75,000 can be used up to 3 more years. If the asset is sold now, the company can get \$20,000. Otherwise the estimated market values and operating costs will apply. A challenger will cost \$130,000 now and have a maximum life of 6 years. Its market value and operating cost estimates are shown. On the basis of these estimates, in what year should the existing asset be replaced? Use an interest rate of 10% per year.

Year	Presently Owned Asset		Challenger	
	Market Value, \$	AOC, \$	Market Value, \$	AOC, \$
1	9,000	-52,000	95,000	-30,000
2	3,000	-61,000	75,000	-32,000
3	1,000	-68,000	55,000	-35,000
4			35,000	-40,000
5			30,000	-47,000
6			15,000	-56,000

N.B.: You are required to show **all** your calculations.