ELEC 481 Homework 3

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Question 1a.

$$\text{EUAC} = A + S(A/F, i, n) = 16500 + 12000(A/F, i, n) = \$19368.$$

Question 1b.

$$P = 16500(P/A, 0.03, 4) + 12000/1.03^4 = \$71994.$$

Question 1c.

$$P = 16500(P/A, 0.03, \infty) + 12000/(1.03^4 - 1) = \$645611.$$

Question 2. Total cost:

$$\text{EUAC}_A = A + P(A/P, i, n) - S(A/F, i, n) = \$2552.$$

$$\text{EUAC}_B = A + P(A/P, i, n) - S(A/F, i, n) = \$2692.$$

Since the cost of machine A is lower than machine B, the company should use machine A.

Question 3. Putting the investment into excel, we arrive at a revenue stream as described in table 1. Using the excel IRR function we see that the annual rate of return is 3.5%.

year	payment	revenues	sum
0	(14,000)		(14,000)
1	-	3,100	3,100
2	-	3,100	3,100
3	-	3,100	3,100
4	-	3,100	3,100
5	-	3,100	3,100

Figure 1: Revenue stream of question 3

Question 4. Since bonds don't compound, the revenue stream can be calculated as seen in figure 2. The yearly income was calculated simply as a percentage of the original bond's worth:

$$A = P \cdot i.$$

Using the IRR function on the last column, we find that the annual effective interest rate is 6.6%.

year	payment / withdrawal	revenues	sum	present value (PV)
0	(10,800)		(10,800)	(10,800)
1		504	504	475
2		504	504	449
3		504	504	423
4		504	504	399
5	12,000	504	12,504	9,341

Figure 2: Revenue flow for question 4.

year	payment	revenues	sum
0	(25,000)	95,000	70,000
1	(21,397)	-	(21,397)
2	(21,397)	-	(21,397)
3	(21,397)	-	(21,397)
4	(21,397)	-	(21,397)

Figure 3: Revenue stream of question 5.

Question 5. To find the effective annual interest rate we have to compare the current option with the alternative, which is to pay by cash. Doing this results in a revenue stream as described in table 3.

Note that the %95000 in revenue represents the incremental analysis of not doing the next best option, which is to buy the machine with cash. The yearly payments were calculated using the formula:

$$A = P(A/P, i, n).$$

Applying the IRR function to the last column we find that the effective annual interest rate is 8.6%.

Question 6. A plot of the EUAC of each option is shown in figure 4. These values were calculated in excel using the formula:

$$\text{EUAC} = A - P(A/P, i, n).$$

From this graph we can find the option with the lowest EUAC for each interest rate, and we can make the table seen in table 1.

Table 1: Choice table for question 6.

Interest rate (%)	Choice
Under 5.8	B
5.8-11.3	A
Over 11.3	Do Nothing

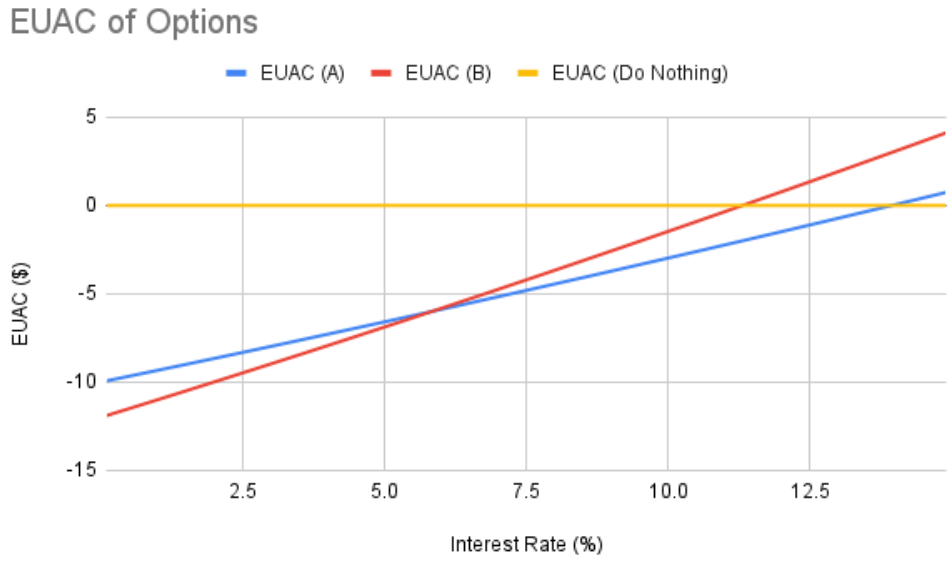

Figure 4: Graph of the EUAC for each option in question 6.