ELEC 481 Homework 6

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Question 1a.

$$i^{30} = \frac{130000}{70000} \implies i = 2.1\%.$$

Question 1b.

$$(1+i)^{30} = \left(1 + i' + f + i'f\right)^{30} = \frac{130000}{70000} \implies i' = -0.1\%.$$

Question 1c.

$$F = P \cdot (1+f)^{30} = \$134470.$$

Question 2. The present value of the costs can be seen in figure 1 (their NPW is the negative of the SUM result at the bottom). As can be seen the Duro option has a lower cost so should be chosen.

Question 3a. See the revenue stream in figure 2. Using the excel IRR function we find the monthly interest rate is 2.73%. This corresponds to an annual interest rate of $1.0273^{12} - 1 = 38.2\%$.

Question 3b. Adjusting this rate we get:

$$i' = \frac{i - f}{1 + f} = 31.3\%.$$

Question 4a.

$$F = 10000 \cdot 1.044^{15} = \$19077.$$

Question 4b. Five years away value:

$$F = 10000 \cdot (\frac{0.044 - 0.052}{1.052} + 1)^5 = \$9626.$$

After 10 years:

$$F = 9626 \cdot (\frac{0.044 - 0.035}{1.035} + 1)^5 = \$10051.$$

At the end:

$$F = 10051 \cdot (\frac{0.044 - 0.031}{1.031} + 1)^5 = \$10701.$$

Question 4c.

$$i' = \sqrt[15]{\frac{10701}{10000}} = 0.5\%.$$

Year	Cost Filterco ($)	Cost Duro ($)
0	6700.00	15000.00
1	1047.62	952.38
2	1037.64	943.31
3	1027.76	934.33
4	1017.97	925.43
5	8371.15	916.61
6	998.67	907.89
7	989.16	899.24
8	979.74	890.67
9	970.41	882.19
10	961.17	566.83
SUM	24101	23819

Figure 1: NPW of the costs for the two options for question 2.

Month	In	Out	Sum
0			0
1		-1000	-1000
2		-1000	-1000
3		-1000	-1000
4		-1000	-1000
5		-1000	-1000
6		-1000	-1000
7		-1000	-1000
8		-1000	-1000
9		-1000	-1000
10		-1000	-1000
11		-1000	-1000
12		-1000	-1000
13		-1000	-1000
14		-1000	-1000
15		-1000	-1000
16		-1000	-1000
17		-1000	-1000
18		-1000	-1000
19		-1000	-1000
20		-1000	-1000
21		-1000	-1000
22		-1000	-1000
23		-1000	-1000
24		-1000	-1000
25		-1000	-1000
26		-1000	-1000
27		-1000	-1000
28		-1000	-1000
29		-1000	-1000
30		-1000	-1000
31		-1000	-1000
32		-1000	-1000
33		-1000	-1000
34		-1000	-1000
35		-1000	-1000