

# ELEC 481 Homework 9

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**Question 1.** See figure 2. Using excel the WACC was calculated to be 8.8% and after tax it was 7.0%.

Debt	Capital	Rate of Return		Year	Income	Costs	Total
Stock	3850000	14.00%		0	1120		1120
Loan	4100000	8.20%		1		-59.91323078	-59.91323078
Bonds	5040000	4.67%		2		-59.91323078	-59.91323078
Total	12990000			3		-59.91323078	-59.91323078
				4		-59.91323078	-59.91323078
WACC	WACC (after tax)			5		-59.91323078	-59.91323078
8.55%	7.45%			6		-59.91323078	-59.91323078
				7		-59.91323078	-59.91323078
				8		-59.91323078	-59.91323078
				9		-59.91323078	-59.91323078
				10		-59.91323078	-59.91323078
				11		-59.91323078	-59.91323078
				12		-59.91323078	-59.91323078
				13		-59.91323078	-59.91323078
				14		-59.91323078	-59.91323078
				15		-1019.913231	-1019.913231

Figure 1: WACC analysis for question 1

**Question 2a.** The total tax will be

$$t = 45282 \cdot 0.15 + (90563 - 45282) \cdot 0.205 + (140388 - 90563) \cdot 0.26 + (200000 - 140388) \cdot 0.29 + 20000 \cdot 0.33 - 11474 \cdot 0.15 = \$51195.78.$$

**Question 2b.** Personal:

$$t = 45282 \cdot 0.15 + (90563 - 45282) \cdot 0.205 + (130000 - 90563) \cdot 0.26 - 11474 \cdot 0.15 = \$28049.63.$$

The corporate tax would be:

$$t = 90000 \cdot 0.15 = \$13500.$$

**Question 2c.** Yes she should, as the total cost of taxes is lower. The amount of money saved is  $51195.78 - 28049.63 - 13500 = \$9646.15$

**Question 3a.** See figure 3 for the completed table using excel. From the table we see that the book value when the equipment is sold would be:

$$BV = 60000 - 16500 - 23925 - 10766.3 - 4844.8 = \$3963.9.$$

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				13		-59.91323078	-59.91323078
				14		-59.91323078	-59.91323078
				15		-1019.913231	-1019.913231

Figure 2: WACC calculations for question 1

Year	Before tax cash flow	CCA	Taxable Income	Income taxes	After tax cash flow	PW
0	-60000				-60000	-60000.00
1	36000	16500.0	19500.0	7800	28200	25636.36
2	36000	23925.0	12075.0	4830	31170	25760.33
3	36000	10766.3	25233.8	10093.5	25906.5	19463.94
4	40036.1	4844.8	35191.3	14076.515	25959.585	17730.75
				NPW		28591.38

Figure 3: Cash flow table for question 3

**Question 3b.** Since the equipment was sold for more than its book value, it is a recaptured depreciation. The amount of gain is  $8000 - 3963.9 = \$4036.1$ .

**Question 3c.** From the table the net present worth at the end of the situation is \$28591.38, since this is above \$0 which is the do nothing alternative, it was a good decision.

**Question 4a.** See figure 4, there the running EUAC is calculated for each year. This was done using the gradient value depreciation formula:

$$(G/A, i, n) = \left( \frac{1}{i} - \frac{n}{(1+i)^n - 1} \right).$$

Based on this we see that the EUAC after 10 years is \$4327.44.

Year	Cost maintenance	EUAC Maintenance	Cost Capital	EUAC Capital	Running EUAC
0			\$14,000.00		
1	\$0.00	\$0.00		\$15,400.00	\$15,400.00
2	\$550.00	\$261.90		\$8,066.67	\$8,328.57
3	\$1,100.00	\$515.11		\$5,629.61	\$6,144.71
4	\$1,650.00	\$759.64		\$4,416.59	\$5,176.23
5	\$2,200.00	\$995.57		\$3,693.16	\$4,688.73
6	\$2,750.00	\$1,222.96		\$3,214.50	\$4,437.46
7	\$3,300.00	\$1,441.89		\$2,875.68	\$4,317.57
8	\$3,850.00	\$1,652.46		\$2,624.22	\$4,276.68
9	\$4,400.00	\$1,854.79		\$2,430.97	\$4,285.76
10	\$4,950.00	\$2,049.00		\$2,278.44	\$4,327.44

Figure 4: Cost analysis for question 4a

**Question 4b.** Looking at the table, we see that the minimum cost is in year 8.

**Question 4c.** To minimize the cost of the machine we want to minimize the EUAC, so it would make sense to get rid of it and replace it at year 8. However this doesn't take into account any money that would result from selling, which would change the analysis.