FIN2010 Problem Set 3

1. A pencil company currently produces 200,000 units a year. It buys pencil tops from an outside supplier at a price of $2 per top. The plant manager believes that it would be cheaper to make these tops rather than buy them. Direct production costs are estimated to be only $1.50 per top. The necessary machinery would cost $150,000. This investment could be written off for tax purposes using straight-line depreciation over 8 years with no salvage value. The plant manager estimates that the operation would require an additional working capital investment of $30,000 at year 0 that is recoverable at the end of the 10 years. If the company pays tax at a rate of 35% and the cost of capital is 15%, would you support the plant manager's proposal? Assume the machinery can last for at least 10 years and all operating cash flows occur at the end of the year.

2. Two years ago, the Krusty Krab Restaurant purchased a grill for $50,000. The owner, Eugene Krabs, has learned that a new grill is available that will cook Krabby Patties twice as fast as the existing grill. This new grill can be purchased for $80,000 and would be depreciated straight line over 8 years, after which it would have no salvage value. Eugene Krab expects that the new grill will produce an operating income (which is equal to revenue minus COGS and overhead costs) of $50,000 per year for the next eight years while the existing grill produces an operating income of only $35,000 per year. The current grill is being depreciated straight line over its useful life of 10 years after which it will have no salvage value. All other operating expenses are identical for both grills. The existing grill can be sold to another restaurant now for $30,000. The Krusty Krab's tax rate is 35%.
   (1) Calculate the free cash flow in year 0 for the grill replacement proposal
   (2) Calculate the free cash flow in year 1

3. Your division is considering two investment projects, each of which requires an up-front expenditure of $25 million. You estimate that the cost of capital is 10% and that the investments will produce the following after-tax cash flows (in millions of dollars):

Year	Project A	Project B
1	5	20
2	10	10
3	15	8
4	20	6

   (1) What are the payback periods for the two projects?

   (2) What are the IRRs of the two projects?

   (3) If the two projects are mutually exclusive and the cost of capital is 5%, which project should the firm undertake?

(4) If the two projects are mutually exclusive and the cost of capital is 15%, which project should the firm undertake?

4. Huawei has spent ￥1.5B in R&D and is ready to launch the first foldable cellphone Mate X. However, they are not sure about whether consumers will like their new phones. They can choose to launch the product at year 0 or year 1. The costs of production will be the same whether they enter the market in year 0 or year 1. The life of Mate X will be 2 years in either case. The relevant cash flow information is given below. Suppose the unit sales will be X and 0.5X in the first and second year. The equipment will be depreciated in 3 years with no salvage value. Suppose the cost of capital is 15% per year. Tax rate for Huawei is 25% and Huawei has enough earnings to realize all tax savings in all the years.

	Launch year	Year+1	Year+2	Year+3
Revenue		17000*X	15000*0.5X	
COGS		8000*X	7000*0.5X	
Overhead		1.8B	0.5B	
CAPEX	3.6B			
Depreciation		1.2B	1.2B	1.2B
Required NWC	0	1000*X	500*X	0

(1) Calculate the project NPV at the time of launch date as a function of X.

Suppose if they launch the phone in year 0, there is a 60% chance that consumers like the product, and X will be 1 million units. There is a 40% chance that consumers are disappointed about the product, and X will be 0.2 million units. If they launch the phone in year one, they will know whether consumers like foldable phones or not, and they can choose to not launch if situation is unfavorable. If they launch the phone in year 1 and the consumers like foldable phones, X will be 0.9 million. If they launch in year 1 even though consumers do not like foldable phones, X will be 0.2 million.

(2) What is the NPV if they launch in year 0?

(3) What is the NPV at year 1 if they launch in year 1? Calculate the NPV for both scenarios. Should they launch the phone if it is revealed that consumers do not like foldable phones?

(4) What is the option value of delaying the launch?

5. Epiphany Industries is considering a new capital budgeting project that will last for three years. Epiphany plans on using a cost of capital of 12% to evaluate this project. Based on extensive research, it has prepared the following incremental cash flow projections:

Year	**0**	**1**	**2**	**3**
Sales (Revenues)		100,000	100,000	100,000
- Cost of Goods Sold		50,000	50,000	50,000

- Depreciation		30,000	30,000	30,000
= EBIT		20,000	20,000	20,000
- Taxes (35%)		7000	7000	7000
= unlevered net income		13,000	13,000	13,000
+ Depreciation		30,000	30,000	30,000
- changes to working capital		5000	5000	-10,000
- capital expenditures	90,000			

(1) What is the NPV of this project?
(2) Epiphany is worried about the reliability of the sales forecast. How sensitive is the project's NPV to a 10% change in sales? (Assuming sales affects COGS but doesn't affect NWC)
(3) How sensitive is the project's NPV to a 10% change in COGS?