## Question 1

Assuming that the demand for some product X changes with its price according to this relation.

$$D = 840 - 8.37 P$$

Where D is **demand** for product X and P is **price** in SGD

Each product X costs SGD \$38 to make. This company is contemplating charging a price somewhere between \$47 and \$78. Create an Excel spreadsheet model that can calculate **product profit** as a function of profit using the reference model below.

$\mathcal{A}$	Α	В	С
1			
2		Demand Constant	840
3		Demand Coefficient	8.37
4			
5		Manufacture Cost	
6		Sales Price	
7		Demand	
8		Per-Unit Profit	
9		Total Profit	

a) Determine the <b>Sales Price</b> which yields the highest <b>Total Profit</b> .	
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Sales Price: _			
Total Profit:			

b) Create another similar model to track the same information (Sales Price, Demand, Per-Unit Profit & Total Profit) for sales prices ranging between \$47 and \$78 (both amounts inclusive). Use this model to create a plot of **Total Profit** against the **Sales Price**. Sketch this plot below and indicate clearly the **Sales Price** that results in zero profit (break even).

## **Question 2**

You wanted to join a newly opened executive club for a period of 6 years but are undecided which membership plan to take up.

You worked out 3 possible options as follow:

Plan A - Join 1-year membership plan and renew up to 6 years

Plan B - Join 2-year membership plan and renew every other year for up to 6 years

Plan C - Join 6-year membership plan straight away

Using an interest rate of 2.5%, create a model using the reference in figure 2 to determine which plan is most cost-effective assuming that all payments are made at the beginning of the period? (Hint: PV formula can be found in class presentation slide if needed)

	A B	С	D	E	F	G	Н
1							
2			Year				
3	Membership period (year)	1	2	6			
4	Initial Payment	\$2,000	\$2,500	\$7,500			
	Membership Renewal Fee						
5	(yearly, every 2 years, every 6 year	rs) \$500	\$750	\$1,000			
6	Monthly Subscription Fee	\$200	\$175	\$150			
7							
8	Interest Rat	e = 2.50%					
9							
10		PLA	N A	PLA	NB	PLA	NC
11	Year	Cash Flow	PV	Cash Flow	PV	Cash Flow	PV
12	1						
13	2						
14	3						
15	4						
16	5						
17	6						
18	PMT (Monthly Subscription Fee)						
40	NPV			1			
19	NEV						

Figure 2

a)	Which plan should you take up?	
		(1 mark)
		(I IIIdik)

b) Fill in values (round off to integer) of Cash Flow and PV into figure 2. (3 marks)

## **Question 3**

Kevin's favorite activity is watching TV and does it daily from 8pm to 11pm without fail. He subscribed to only 3 channels and habitually starts watching Channel 1 at 8pm after his dinner. Whenever he feels bore or when a commercial break occurs, he will switch channel. He switches randomly to any of the other 2 channels with equal likelihood.

Kevin does not have any favorite TV program, his time spend watching any channel follows a **normal distribution** with a mean of 20 minutes and standard deviation of 5 minutes. There is a 50% chance that a commercial break may occur when he is watching a particular channel. If a commercial break does occur, it can be assumed that it will only occur 5 minutes into the start of watching a new channel.

a) Create a model using the reference in figure 3 to capture the clock time from 8pm to 12 pm, TV channel, watching time and likelihood of commercial break occurring.

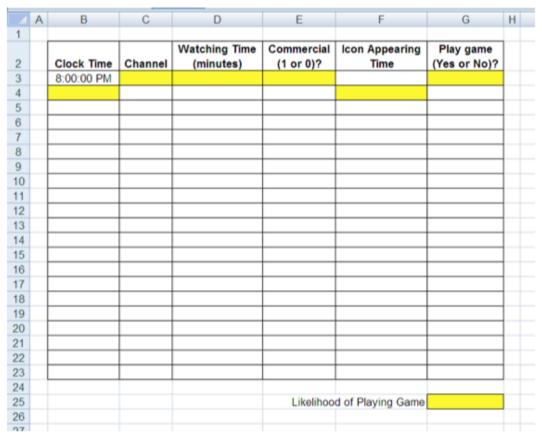


Figure 3