Economics 205
UNIVERSITY OF VICTORIA
Managerial Economics
Spring Term, 2014
Solutions

Assignment 1

Due: Friday, January **24th, 2014**, **@ 3 pm.** (In the box marked "ECON 205" near the Economics Department Office)

Question 1: Complete the following:

1) Using an interest rate of 5%, calculate the present value of a $2,000 payment to be received at the end of:
   a) one year. ***(1 mark)***

$$PV = \frac{X}{(1+i)^t} = \frac{2000}{(1.05)} = \$1904.76$$

   b) two years. ***(1 mark)***

$$PV = \frac{X}{(1+i)^t} = \frac{2000}{(1.05)^2} = \frac{2000}{1.1025} = \$1814.06$$

   c) three years. ***(1 mark)***

$$PV = \frac{X}{(1+i)^t} = \frac{2000}{(1.05)^3} = \frac{2000}{1.1578} = \$1727.68$$

Question 2: Determine the present value of a firm's five-year expected profit stream. (Treat all profits as being received at year-end.) Use a risk-adjusted discount rate (interest rate) of 10% ***(5 marks)***

Year	Expected Profit ($ millions)
1	5.5
2	5.7
3	6.2
4	8.1
5	7.7

$$PV = \sum_{t=1}^{5} \frac{\text{expect profit}}{(1+\text{i})^{\text{t}}}$$

$$PV = \frac{5.5}{(1.1)^1} + \frac{5.7}{(1.1)^2} + \frac{6.2}{(1.1)^3} + \frac{8.1}{(1.1)^4} + \frac{7.7}{(1.1)^5}$$

$$PV = 5 + 4.711 + 4.6582 + 5.5324 + 4.7811$$

$$PV = 24.6827$$

Question 3:

TMZ.com

Arnold Schwarzenegger has 2 very good reasons NOT to finalize his divorce ... and one has to do with writing a big fat check to **Maria Shriver**.

As you know ... Maria filed for divorce in July, 2011, after finding out her hubby had been banging the maid and produced a son.

Sources familiar with Arnold's situation tell TMZ ... there's no prenup so under California law it's pretty simple -- 50/50. And our sources say there's no real issue over custody of their only minor child.

So why, you ask, has this divorce dragged on 2 1/2 years? We're told Arnold doesn't want to write a gargantuan check to Maria ... and we know how much -- and it hurts.

Sources tell us their net worth is around $400 million. We're told Arnold knows Maria is entitled to half -- but knowing it and watching around $200 million leave your bank account are 2 very different things.

According to unnamed sources, the settlement between Arnold Schwarzenegger and Maria Shriver, his wife, cost $200 million. Should Maria accept the lump sum of $200 million immediately or accept payments of $42 million over five years? If the appropriate discount (interest) rate is 3%, which alternative is better for the Maria?
(6 Marks)

If the appropriate interest rate is 3%:

Year	Present value $PV = \frac{\text{Future Value}}{(1+i)^t}$
1	$PV = \frac{42{,}000{,}000}{(1+0.03)^1} = \frac{42{,}000{,}000}{1.03} = 40{,}776{,}699.03$
2	$PV = \frac{42{,}000{,}000}{(1+0.03)^2} = \frac{42{,}000{,}000}{1.0609} = 39{,}589{,}028.18$
3	$PV = \frac{42{,}000{,}000}{(1+0.03)^3} = \frac{42{,}000{,}000}{1.092727} = 38{,}435{,}949.69$
4	$PV = \frac{42{,}000{,}000}{(1+0.03)^4} = \frac{42{,}000{,}000}{1.1255} = 37{,}316{,}456.01$
5	$PV = \frac{42{,}000{,}000}{(1+0.03)^5} = \frac{42{,}000{,}000}{1.15927} = 36{,}229{,}568.94$
	Sum=192,347,701.90

At 3% interest, Maria should not take the 5 year plan. The present value of the future cash flow is less than $200 million.

Garrison Dry Chemical Fire Extinguisher

Question 4: **(5 Marks)**

Suppose that the demand and supply functions for Garrison Dry Chemical Fire Extinguishers are:

$$Q_D = 120 - 4P$$
$$Q_S = 10 + 6P$$

a) What are the equilibrium price and quantity? ***(2 marks)***

At Equilibrium $Q_D = Q_S$

$120 - 4P = 10 + 6P$

$110 = 10P$

$P = \frac{110}{10} = 11$

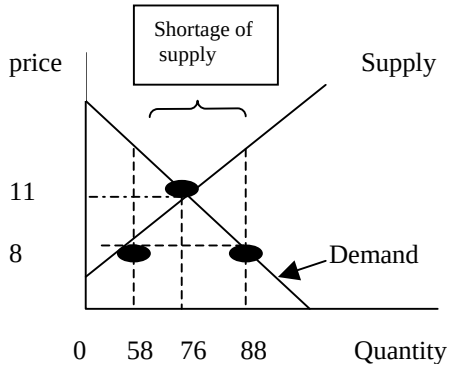
$Q_E = 120 - 4(11) = 76$ *units*

Equilibrium price: $11
Equilibrium quantity=76

b) What is the market outcome if price is $8? What do you expect to happen and why? (Hint: prices are not fixed at $8.) Illustrate with a simple diagram. ***(3 marks)***

$$Q_D = 120 - 4(8) = 88$$
$$Q_S = 10 + 6(8) = 58$$

There will be too much demanded. Due to the excess demand, the price will have to increase, decreasing the excess demand. As the price increases, suppliers will be willing to increase supply. Price increases until it reaches the equilibrium price of $11 and equilibrium quantity.



Question 5: (6 Marks)

The total cost function of the Showtime Corp is TR=115+35Q+2Q^2, where TC is total cost and Q is output. The total revenue function is TC=227-5Q+3Q^2, where TR is total revenue and Q is still output.

A) What is the marginal cost when output is 10? ***(2 marks)***

MC=-5+6Q
-5+6(10)=55

B) What is the marginal revenue at an output of 10? ***(2 marks)***
MR = 35+4(Q)= 75.

C) Determine the profit maximizing output? ***(2 marks)***
MR=MC
-5+6(Q)=35+4Q
2Q=40
Q=20 ← **ANSWER**

Bonus:Question 6: (5 marks)

The Smell-This Company, a manufacturer of body scent supplies, expects its 2011 demand curve for its products is

P=285-2Q,

where P is the starting price (in dollars) of a typical bundle of supplies, and Q is the number of units sold per month.

a) To sell 5 units per month, what price would the company have to charge? ***(1 mark)***
P=285-2(5)=275

Price would have to be $275

b) If the company sets a price of $200, how many units will the company sell per month? ***(1 mark)***

P =285-2Q
200 = 285-2Q
-85 = -2Q
Q =42.5

It would sell 42.5 units per month.

c) What is the price elasticity of demand if price equals $200? ***(1 mark)***

Using this formula:

$$\left(\frac{\partial Q}{\partial P}\right)\left(\frac{P}{Q}\right)$$

P=$200
Q=42.5
Re-arranging the demand function: P=285-2Q
2Q=285-P
Q=142.5-0.5P

$$\left(\frac{\partial Q}{\partial P}\right) = -\left(\frac{1}{2}\right) = -0.5$$

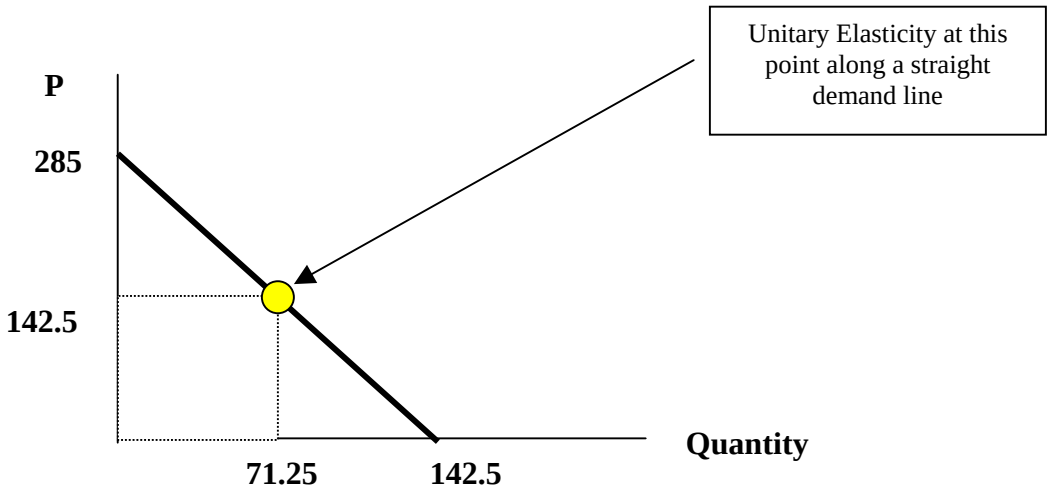
so the price elasticity of demand is:

$$= \left(-\frac{1}{2}\right)\left(\frac{200}{42.5}\right)$$

$$= (-0.5)(4.70588) = -2.3529$$

d) At what price, if any, will the demand for the company's product be of unitary elasticity? ***(2 marks) (Hint: Use a diagram to illustrate.)***

Unitary elasticity is where it would equal -1.
(-0.5)*P/Q = -1



Using algebra, solve for P: (multiply through by –1 to clean up the equation first.)

$$0.5\left(\frac{P}{142.5-\frac{P}{2}}\right)=1$$

multiply both sides by 2:

$$\left(\frac{P}{142.5-\frac{P}{2}}\right)=2$$

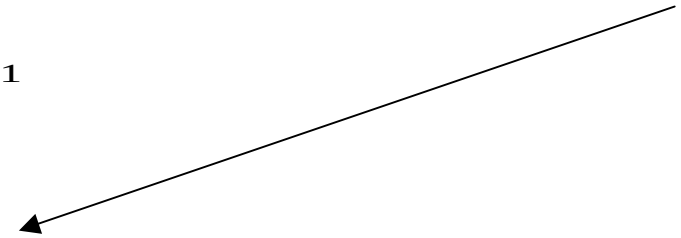
$$\frac{P}{\frac{285-P}{2}}=2$$

$$=\frac{2P}{285-P}=2$$

divide by 2:

$$\left(\frac{P}{285-P}\right)=1$$

$$P=285-P$$
$$2P=285$$
$$P=142.5$$



Q= 142.5-0.5(P)=142.5-0.5(142.5)
=71.25

Total Marks: 25