Economics 101 Winter 2012
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Problem Set #1 – Answer key

Part 1: Look over all the questions and problems in Baye Chapters 1-6. Write out and turn in your solutions to:

Chapter 1

Problem 9

a. Total benefit when $Q = 2$ is $B(2) = 25(2) - 2^2 = 46$. When $Q = 10$ $B(10) = 25(10) - 10^2 = 150$.
b. Marginal benefit when $Q = 2$ is $MB(2) = 25 - 2(2) = 21$. When $Q = 10$ is $MB(2) = 25 - 2(10) = 5$.
c. The level of Q that maximizes total benefits is $MB(Q) = 25 - 2Q = 0$, or $Q = 12.5$
d. Total cost when $Q = 2$ is $C(2) = 5 + 2^2 = 9$. When $Q = 10$ $C(10) = 5 + 10^2 = 105$.
e. Marginal cost when $Q = 2$ is $MC(Q) = 2(2) = 4$. When $Q = 10$ $MC(Q) = 2(10) = 20$.
f. The level of Q that minimizes total cost is $MC(Q) = 2Q = 0$, or $Q = 0$.
g. Net benefits are maximized when $MNB(Q) = MB(Q) - MC(Q) = 0$, or $25 - 2Q - (5 + 2Q) = 0$. Some algebra leads to $Q = 20/4 = 5$ as the level of output that maximizes net benefits.

Problem 14

a. Accounting costs equal $3,160,000 per year in overhead and operating expenses. Her implicit cost is the $56,000 salary that must be given up to start the new business. Her opportunity cost includes both implicit and explicit costs: $3,160,000 + $56,000 = $3,216,000.
b. To earn positive accounting profits, the revenues per year should greater than $3,160,000. To earn positive economic profits, the revenues per year must be greater than $3,216,000.

Problem 17

a. Since the profits grow faster than the interest rate, the value of the firm would be infinite. This illustrates a limitation of using these simple formulas to estimate the value of a firm when the assumed growth rate is greater than the interest rate.

b. $PV_{firm} = \pi\left[\frac{1+i}{i-g}\right] = \$2.5\left[\frac{1.08}{0.05}\right] = \$54$ billion.

c. $PV_{firm} = \pi\left[\frac{1+i}{i-g}\right] = \$2.5\left[\frac{1.08}{0.08}\right] = \$33.8$ billion.

d. $PV_{firm} = \pi\left[\frac{1+i}{i-g}\right] = \$2.5\left[\frac{1.08}{0.11}\right] = \$24.5$ billion.

Chapter 2

Problem 10

a. The cost of purchasing the surplus is $\$25 \times (15-6) = \$225$.

b. The deadweight loss resulting from a \$25 price floor is $0.5 \times (25-20.5) \times (15-12) = \$6.75$.

Problem 20

Substituting $P_{desktop} = 940$ into the demand equation yields $Q^d_{memory} = 9060 - 80P_{memory}$. Similarly, substituting $N = 100$ into the supply equation yields $Q^S_{memory} = 1100 + 20P_{memory}$. The competitive equilibrium level of industry output and price occurs where $Q^d_{memory} = Q^S_{memory}$, which occurs when industry output $Q^*_{memory} = 2692$ (in thousands) and the market price is $P^*_{memory} = \$79.60$ per unit. Since 100 competitors are assumed to equally share the market, Viking should produce 26.92 thousand units. If $P_{desktop} = \$1040$, $Q^d_{memory} = 8960 - 80P_{memory}$. Under this condition, the new competitive equilibrium occurs when industry output is 2672 thousand units and the per-unit market price is \$78.60. Therefore, Viking should produce 26.72 thousand units. Since demand decreased (shifted left) when the price of desktops increased, memory modules and desktops are complements.

Chapter 3

Problem 10

a. The own-price elasticity of demand is -1.36, so demand is elastic.

b. The income elasticity of demandis-0.14, so X is an inferior good.

Problem 15

To maximize revenue, Toyota should charge the price that makes demand unit elastic. Using the own price elasticity of demand formula,

$E_{Q,P} = (-1.25)\left(\frac{P}{100{,}000 - 1.25P}\right) = -1$. Solving this equation for P implies that the revenue maximizing price is $P = \$40{,}000$.

Chapter 4

Problem 12

See Figure 4-6. When there is no food stamp program, the market rate of substitution is –0.5. The Food Stamp program leaves the market rate of substitution unchanged, and a consumer can purchase $170 of food without spending her income. A dollar-for-dollar exchange of food stamps for money further expands a consumer's opportunity set, potentially making her better off.

Budget Constraint with and without Food Stamps

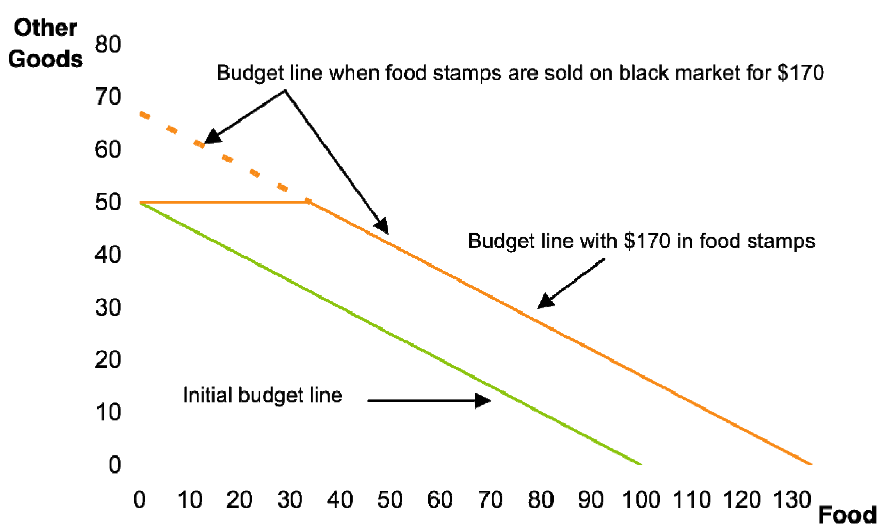

Figure 4-6

<u>**Part 2:**</u>

1. Consultants tell a firm's managers that its total cost per week for producing q units of its main product and r units of a secondary product is well approximated by the function
$C = 100 + 3r + 2q + 0.1q^2 - 0.02qr - 0.03qQ$,
where Q is the cumulative total output of the main product. Are there economies of scope? Of scale? A learning curve? Justify your answers briefly.

Economies of scope: Yes! Because producing both goods (q and r) reduces the cost (negative coefficient -> -0.02qr).

Learning Curve: Yes. We also observe a negative coefficient with respect to the cumulative total output.

Economics of scale: Let's focus on the main product. Notice that we have a fixed cost (=100) and variable cost (the linear and quadratic term). The average cost will decrease as long as the drop in the average fixed cost is larger than the increase in the average variable cost.