

ANSWER KEY

Economics 3550
Intermediate Microeconomics
Professor Rous
Mid-Term Exam 2
November 11, 2002

Name _____

Clearly label all graphs for full credit and please write legibly; I cannot grade what I cannot read.

Number of points each question is worth in parentheses.

1. (6) If the % change in the quantity demanded of a good = -4% and the % change in income is 2%, then the income elasticity coefficient is -2.

True/False: Economists routinely drop the ‘-’ sign since it provides no useful information. Explain.

False. For income elasticity, the good is inferior if the income elasticity is <0 and normal if the income elasticity is >0

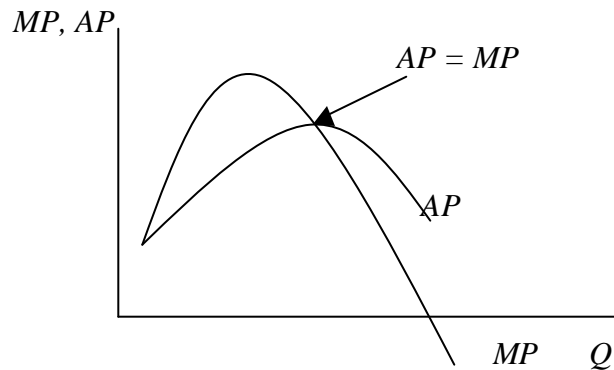
2. (6) Demand for goods that make up a very small portion of your budget are typically more _____ than goods that take up a large portion of your budget. And normal goods are typically more _____ than inferior goods.
- a. elastic ; elastic (3pts)
 - b. elastic ; inelastic
 - c. inelastic ; elastic (6 pts)**
 - d. inelastic ; inelastic (3 pts)
3. (6) For a normal good, when the price of the good **increases**...
- a. the substitution effect is negative and the income effect is negative. (6 pts)**
 - b. the substitution effect is negative and the income effect is positive. (3 pts)
 - c. the substitution effect is positive and the income effect is negative. (3 pts)
 - d. the substitution effect is positive and the income effect is positive.
- 4.(6) Suppose an individual's demand for peanut butter is the following: $P = 15 - 2.5Q_d$ and the current price of peanut butter is \$2. What is the price elasticity?

$$Q_d = 5.2$$

$$E = \frac{1}{2.5} * \frac{2}{5.2} = .154$$

- 5.(6) If the slope of a ray connecting the origin to a point (Point X) on a Total Product curve has the exact same slope as the Total Product curve at Point X, then:
- at Point X, MP_L is at its highest
 - at Point X, AP_L is at its highest.**
 - at Point X, production is exhibiting increasing marginal returns.
 - at Point X, production is experiencing Constant Returns to Scale.

If the slope of a ray connecting the origin to a point (Point X) on a Total Product curve has the exact same slope as the Total Product curve at Point X, then $MP = AP$.



6. (6) If capital increases from 300 to 320, labor from 250 to 266.67, and output from 10,000 to 10,500, is production experiencing increasing, decreasing or constant returns to scale? How do you know?

% change in inputs = 6.67%

% change in output = 5.0%

Decreasing returns to scale since the %D inputs > %D output and therefore, LRAC will increase with an increase in production.

7. (6) To maximize profit (or minimize loss), a perfectly competitive firm should shut down if:
- profit < 0.
 - $MR < ATC$
 - profit > -FC
 - $TR < VC$**

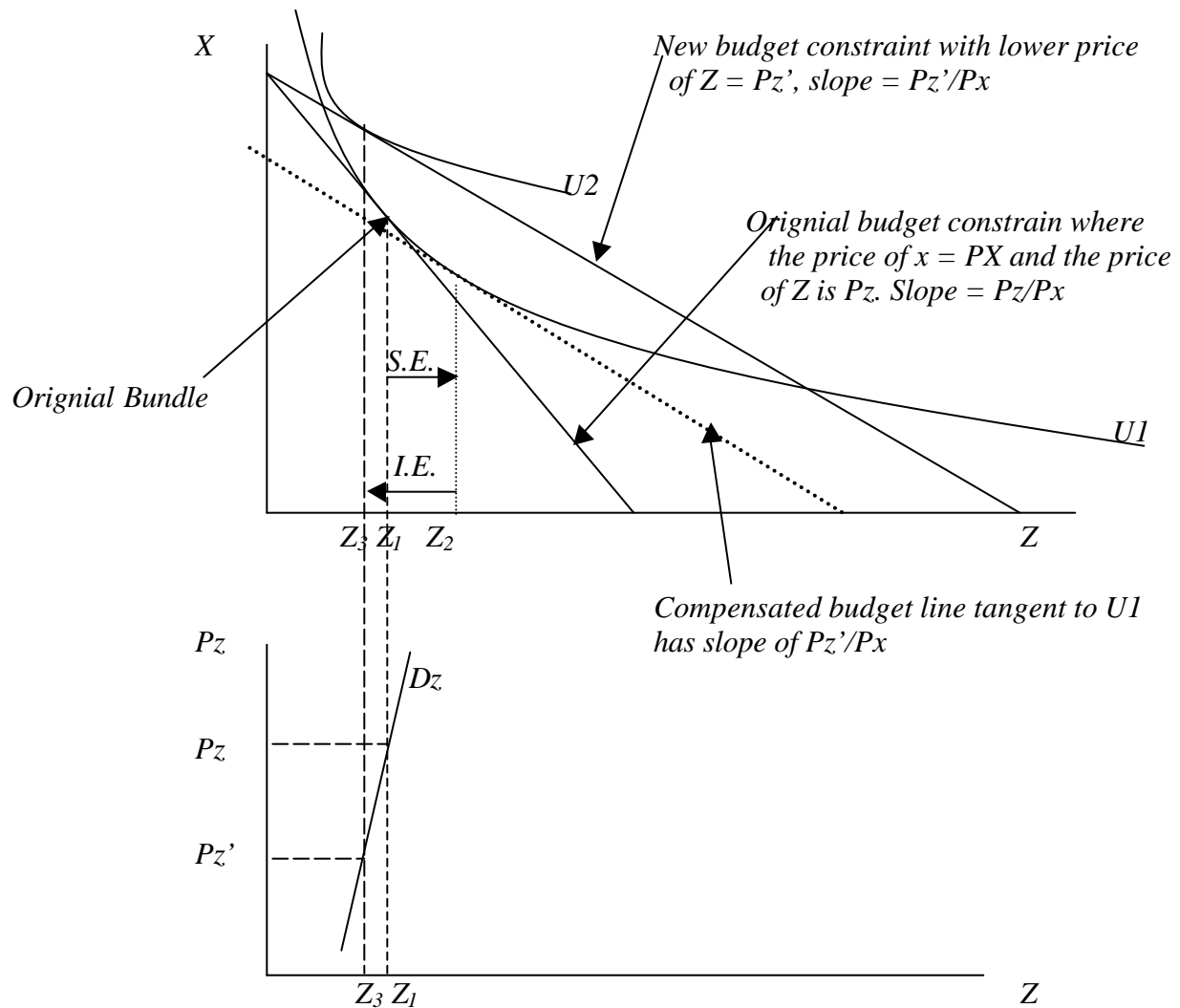
a, This only means the firm is losing money in the short run. They will exit in the long run, but it is unclear whether they will produce $Q = 0$ (i.e. shut down) in the short run.

b. All this means is profit < 0, see above.

c. If the profit > -FC, then the loss is smaller than the FC and the firm is better off producing in the short run.

d. The answer. In this case, the firm is not even covering their variable cost so their loss from producing is the FC + the uncovered portion of the variable cost. Shutting down and continuing to pay the FC is a better option.

8.(12) **Verbally and graphically** explain how it is theoretically possible for demand curves to slope upwards. I have provided the following axes and budget constraints. (Hint: it will be easier to draw if you begin with a higher price and then let the price fall). On the graph, please label as much as possible (including the income and substitution effects).



When the price of Z falls, the substitution effect leads to an increase in consumption, but the good is inferior and the increase in purchasing power causes large decrease in consumption. Since the negative income effect is larger than the positive substitution effect, the good is a Giffen good and the resulting demand curve slopes upward.

9. (6) Farmer Sue has just received a notice that her farm's fire insurance premium is going to rise \$300 per year. Her economic profit each year is \$600. Will the new premium cause her to increase production, decrease production, or leave production unchanged? Briefly explain.

Production will not change because the increase in her insurance premium is a change in her fixed cost and not variable cost. Since her profit is greater than the increase, there is no change it will cause her to shut down or exit the industry. To affect the production decision, the change would have to affect MC.

10. Assume the Ace Ball Bearing Company has the following daily short run production function when $K = 900$:

$$Q = 5(K*L)^{.5}$$

- a. (4) What is the firm's marginal product of labor function?

$$MPL = \frac{75}{\sqrt{L}}$$

Assuming the wage rate is \$75 per day and the rental rate paid to capital is \$500:

- b. (4) What is the firm's average variable cost function?

$$L = \frac{Q^2}{22,500}$$

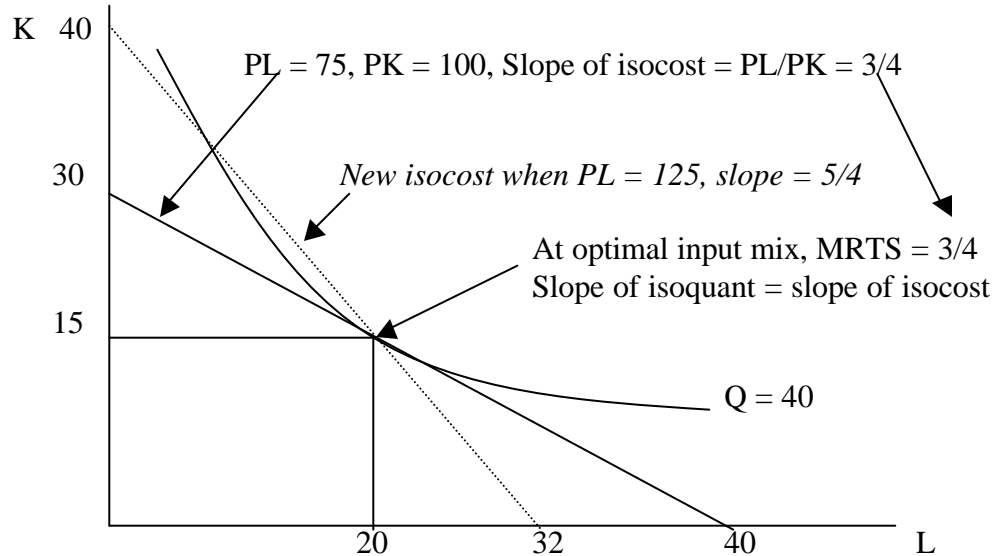
$$VC = \frac{Q^2}{300}$$

$$AVC = \frac{Q}{300}$$

11. Bob's Lawn Service (BLS) always mows 40 lawns per day using two inputs, capital, K, and labor, L. BLS rents capital at a price of \$100 per day, and the workers get paid \$75 per day. He has been producing on his expansion path with 15 units of capital and 20 laborers.

a.(6) Graph the current BLS isoquant and isocost curves below. What is the MRTS at the cost minimizing input combination? What is the total cost of production?

$$TC = 100 \cdot 15 + 75 \cdot 20 = 3000$$



- b. (6) Suppose the price of labor rises to \$125. If the amount of K and L cannot change in the short run, Will MPL/PL be $>$ or $<$ MPK/PK ? Use the above graph if you want to.
Now that PL has risen, MPL/PL must fall, so $MPL/PL < MPK/PK$

What is the total cost of production now? $125 \cdot 20 + 100 \cdot 15 = 4000$

- c. (6) To minimize the cost of mowing 40 lawns, in the long run, should BLS use
- **more K and less L**
 - more L and less K

Now that $MPL/PL < MPK/PK$, BLS gets more bang or the buck with capital, so they should use more K and less L in production to minimize cost.

- d. (6) Explain how changing the quantity of each input used can lower the cost of mowing 40 lawns in the long run.

By letting go of one laborer, the firm saves \$125. To maintain the same level of output, they can hire less than \$125 worth of capital. They should do this until there is no more cost savings from trading off capital for labor. At that point, $MRTS = 5/4$

12. (8) President Bush announced new trade restrictions on foreign steel since it is cheaper than the steel made in the U.S and steel companies have been losing money for some time now (profit <0). The new restrictions are in the form of a tariff that raises the price of steel to the same level as U.S. steel. What would Hazlitt say about this tariff?

This is more than I expected, but I wanted to use the opportunity to rant.

Profit is the prime motivator for moving resources in and out of industries in accordance of the resources efficient use. When profits are high, resources flow into an industry where they are more highly valued and out of industries where they have been producing less societal benefit. By instituting a tariff, President Bush is maintaining a sub-optimal (inefficient) use of resources in the U.S. This means that hundreds of millions of Americans will be paying more for products that use steel as inputs. As part of the inefficiency, steel will be inefficiently replaced by other materials in the production of goods. So goods will be produced with more expensive alternatives such as plastics and other materials that would not be used except for the tariff. This contributes to the higher price of other goods. Though probably a very small effect, it will elevate the poverty rate in the U.S. by some (perhaps barely) measurable amount.