

ECO 300 – MICROECONOMIC THEORY
Fall Term 2005
SAMPLE MIDTERM EXAMINATION –ANSWER KEY

QUESTION 1: MULTIPLE CHOICE. (Total 25 points, 3 each, and 1 if all 8 correct)

1. a. (This causes a movement along the demand curve, not a shift of the curve.)
2. b. ($Q_d = 105$ and $Q_s = 75$.)
3. c.
4. a.
5. d.
6. a.
7. e.
8. e.

QUESTION 2:

Originally, Granny maximizes $U(X,Y) = X Y$ subject to $10 X + 5 Y = 500$. Using the standard result, she spends \$250 on each, consuming $X = 25$, $Y = 50$ and getting utility = 1250. (8 points)

When $P_X = 16$ and $P_Y = 2$, the original consumption quantities will cost $16 * 25 + 2 * 50 = 500$, so no change in income is needed. (5 points)

Suppose Z is the income needed to achieve the same utility. The optimal quantities are $X = Z/(2*16) = Z/32$, and $Y = Z/(2*2) = Z/4$. Utility is $Z^2 / 128$. Setting this equal to 1250, $Z^2 = 128 * 1250 = 64 * 2500$, so $Z = 8 * 50 = 400$. (12 points, 2 taken off if the square root is not correctly calculated.)

QUESTION 3:

Consider the following four lotteries:

- A: \$6000 with probability 0.45, 0 with probability 0.55
- B: \$2500 with probability 0.90, 0 with probability 0.10
- C: \$6000 with probability 0.001, 0 with probability 0.999
- D: \$2500 with probability 0.002, 0 with probability 0.998

The behavior of a consumer who prefers A to B but D to C, or prefers B to A but C to D, exhibits the Allais paradox. (15 points for a mathematically correct example. 3 taken off for failing to say correctly what kind of choice patterns constitute the paradox. Bonus 2 added if the answer uses an example different from the ones given in class or precept.)

This is called a paradox because such behavior violates the expected utility theory of choice under risk. A person conforming to that theory would prefer A to B if

$$0.45 U(6000) + 0.55 U(0) > 0.90 U(2500) + 0.10 U(0)$$

$$0.45 [U(6000) + U(0)] > 0.90 U(2500)$$

$$U(6000) + U(0) > 2 U(2500)$$

The person prefers C to D if

$$0.001 U(6000) + 0.999 U(0) > 0.002 U(2500) + 0.998 U(0)$$

$$0.001 [U(6000) + U(0)] > 0.002 U(2500)$$

$$U(6000) + U(0) > 2 U(2500)$$

(10 points for the “Why a paradox?” question. 2 deducted for merely saying that the behavior violates the independence axiom without showing the math of it. Bonus 1 added for saying that the behavior can still be consistent with rationality in the basic sense of completeness and transitivity of preferences.)

QUESTION 4:

Production function	MP_K	MP_L	Returns to Scale	Marginal product of Capital	Marginal product of Labor
$6 K^{0.3} L^{0.7}$	$1.8 K^{-0.7} L^{0.7}$	$4.2 K^{0.3} L^{-0.3}$	Constant	Diminishing	Diminishing
$K + 3 L$	1	3	Constant	Constant	Constant
$K^{0.5} + 3 L^{0.5}$	$0.5 K^{-0.5}$	$1.5 L^{-0.5}$	Diminishing	Diminishing	Diminishing
$K^{0.5} + 3 L^2$	$0.5 K^{-0.5}$	$6 L$	Indeterminate	Diminishing	Increasing

There are 20 items to be answered, and 25 points. 1 point taken off for each wrong answer up to 15, and 2 points for each wrong answer beyond that.