**MIDTERM 1**

**Microeconomic Theory I**
**ECO 2144**

**Professor Rose Anne Devlin**

**September 23, 2019**

NAME: Answers.

Student Number: _____

SIGNATURE: _____

**Notes**

The exam will end 5 minutes before the end of the period. **Therefore, it will end at 2:15pm.**

This midterm has TWO parts: Part 1 has 18 multiple choice questions; Part 2 contains 3 problems. There are 9 pages, including the cover page.

You have 75 minutes and 50 marks in total. This means that you should budget **about 1.5 minutes** per mark.

Read over all of the questions. **Do the questions that you know well first**, then go to the ones of which you are less sure.

ALL ANSWERS ARE ON THE QUESTION SHEET – NO SUPPLEMENTAL PAPERS ALLOWED. USE THE BACK OF THE SHEETS FOR ROUGH WORK

Basic calculators are allowed. No electronic device that can be programmed with text, or that has transmitting possibilities can be used.

No cellular phones are allowed.

**PART 1: 18 MULTIPLE CHOICE (1.5 marks each, 27 marks).**

Circle the letter that best answers the question. Only one answer is accepted.

1) If the price of automobiles were to increase substantially, the demand curve for public transportation would most likely:
A) shift rightward.
B) shift leftward.
C) remain unchanged.
D) remain unchanged while quantity demanded would change.

$P_A \uparrow \Rightarrow D_{p+} \uparrow$

2) If the demand for bananas is Q = 200 - 5p, then its inverse demand function is:
A) Q = 5p - 200.
B) Q = 40 - 0.2p.
C) p = 40 - 5Q.
D) p = 40 - 0.2Q.

$5p = 200 - Q$
$p = 40 - 0.2Q$

3) Sugar can be produced from sugar beets. When the price of those beets falls,
A) the demand curve for sugar would shift right.
B) the demand curve for sugar would shift left.
C) the supply curve for sugar would shift right.
D) the supply curve for sugar would shift left.

$P_b \downarrow \; S_s \uparrow$

4) Plastic and steel are substitutes in the production of body panels for certain automobiles. If the price of plastic increases, with other things remaining the same, we would expect:
A) the price of steel to fall.
B) the demand curve for steel to shift to the right.
C) the demand curve for plastic to shift to the left.
D) nothing to happen to steel because it is only a substitute for plastic.
E) the demand curve for steel to shift to the left.

$P_p \uparrow \; D^s \uparrow$

Let's suppose that the demand for books is: $Q^d = 120 - P$ and the supply of books is: $Q^s = 5P$.
Answer the following **three** questions:

5) What is the equilibrium price of books?
A) 5
B) 10
C) 15
D) 20
E) none of the above

$120 - p = 5p$
$6p = 120$
$p = 20$

6) What is the equilibrium quantity of books sold?
A) 25
B) 50
C) 75
D) 100
E) none of the above

$Q = 100$

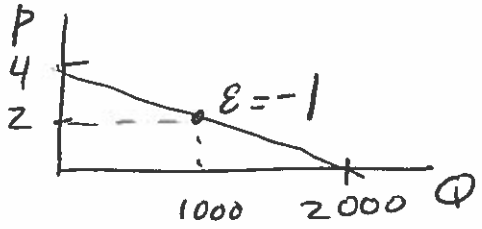
7) If P = $15, which of the following is true?
A) There is a surplus equal to 30.
B) There is a shortage equal to 30.
C) There is a surplus, but it is impossible to determine how large.
D) There is a shortage, but it is impossible to determine how large.

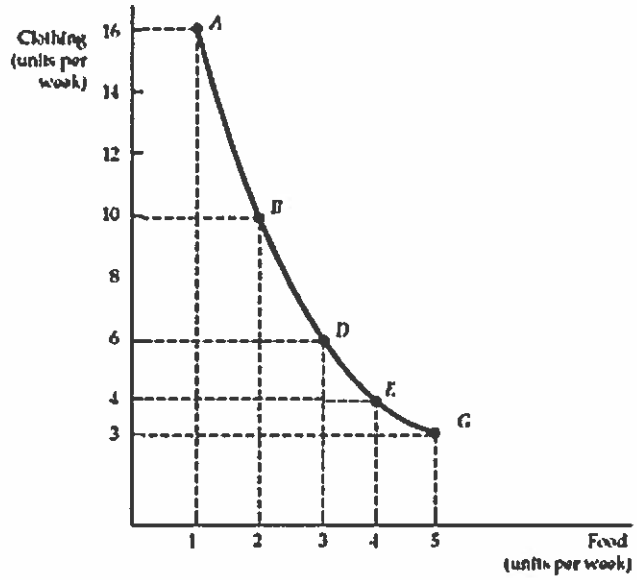
120 − 15 = 105 demanded
5(15) = 75 supplied
− 30 shortage

8) The price elasticity of the supply of gasoline is 0.4. If the price of gasoline rises by 8%, what is the expected change in the quantity of gasoline supplied?
A) +3.2%
B) -3.2%
C) +32.0%
D) +0.32%

8(0.4) = 3.2% ↑

9) If the demand function for orange juice is expressed as Q = 2000 - 500p, where Q is quantity in litres and p is price per litre measured in dollars, then the demand for orange juice has a unitary elasticity when price equals
A. $0.
B. $1.
C. $2.
D. $4.




10) From the above Figure, the value of the marginal rate of substitution between points B and D is:
A) –4
B) -0.25
C) 10
D) 6

Δ B = - 4
Δ D = 1
= - 4

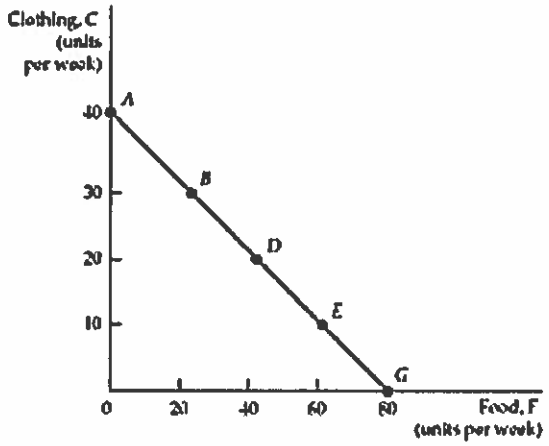
Consider the following three baskets of goods: A, B, and C:

**Table 1**

| | Food | Clothing |
|---|---|---|
| A | 6 | 3 |
| B | 8 | 5 |
| C | 5 | 8 |

note: for sure B ≻ A b/c there is more of everything in B.

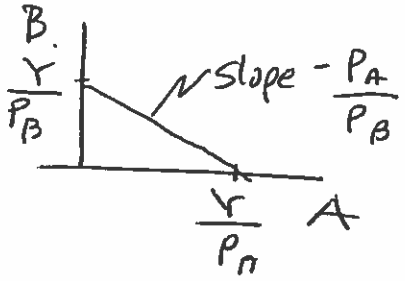
11) If preferences satisfy all of the basic assumptions, then we know that:
A) A is on the same indifference curve as B. × B ≻ A
B) B is on the same indifference curve as C. don't know
C) A is preferred to C. don't know
D) B is preferred to A.
E) Both A and B answer choices are correct.

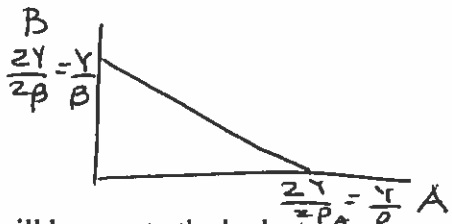



$\frac{\text{rise}}{\text{run}} = -\frac{40}{80} = -\frac{1}{2}$

12) From the above graph, the slope of the budget line equals:
A) –1
B) –2
C) -0.5
D) –1.5

13) If the quantity of good A ($Q^A$) is plotted along the horizontal axis, the quantity of good B ($Q^B$) is plotted along the vertical axis, the price of good A is $P^A$, the price of good B is $P^B$ and the consumer's income is Y, then the slope of the consumer's budget constraint is:
A) $-Q^A/Q^B$.
B) $-Q^B/Q^A$.
C) $-P^A/P^B$.
D) $-P^B/P^A$.
E) $Y/P^A$ or $Y/P^B$.






14) If the prices of goods A and B double and income doubles, what will happen to the budget line?
A) The intercepts of the budget line will increase.
B) The intercepts of the budget line will decrease.
C) The slope of the budget line may either increase or decrease.
D) Insufficient information is given to determine what effect the change will have on the budget line but we know society is worse-off.
(E) There will be no effect on the budget line.

15) Pencils sell for 10 cents and pens sell for 50 cents. Suppose Jack, whose preferences satisfy all of the basic assumptions, buys 5 pens and one pencil each semester. With this consumption bundle, his MRS of pencils for pens is 3. Which of the following is true?
A) Jack could increase his utility by buying more pens and fewer pencils.
(B) Jack could increase his utility by buying more pencils and fewer pens.
C) Jack could increase his utility by buying more pencils and more pens.
D) Jack could increase his utility by buying fewer pencils and fewer pens.
E) Jack is already maximizing his utility.

$\frac{MU_{pencils}}{MU_{pens}}$

pencils | opt. $MRS = \frac{P_{pens}}{P_{pencils}}$

$3 \neq 5 \Rightarrow$

want $MU_{pencils}/pens$ ↓

$MU_{pens}$ ↑

∴ more pencils fewer pens.

16) An individual consumes only two goods, $q_1$ and $q_2$. Which of the following expressions represents the utility maximizing market basket?
A) $MRS_{2,1}$ is at a maximum.
B) $P_1/P_2$ = money income.
C) $MRS_{2,1}$ = money income.
(D) $MRS_{2,1} = P_1/P_2$.
E) all of the above

17) Alfred derives utility from consuming iced tea and lemonade. For the bundle he currently consumes, the marginal utility he receives from iced tea is 16, and the marginal utility he receives from lemonade is 8. Instead of consuming this bundle, Alfred should:
A) buy more iced tea and less lemonade.
B) buy more lemonade and less iced tea.
C) buy more iced tea and lemonade.
D) buy less iced tea and lemonade.
(E) None of the above is necessarily correct.

$\frac{MU_{it}}{MU_l} = \frac{P_{it}}{P_l}$ ← no info on p's or preferences

$\frac{16}{8} = 2$

18) If the utility function (U) between food (F) and clothing (C) can be represented as $U = \sqrt{F \times C}$, then the marginal utility of food equals
A) $\sqrt{F/C}$.
B) $\sqrt{C/F}$.
(C) $1/2\sqrt{C/F}$.
D) $1/2\sqrt{F/C}$.

$U = F^{1/2}C^{1/2}$.

$MU_f = \partial U/\partial f = \frac{1}{2}F^{-1/2}C^{1/2}$

$= \frac{1}{2}\sqrt{C/F}$

PART 2: There are THREE problems, marks awarded as indicated (23 marks in total). You can use the back of the question sheet for additional space if necessary. You MUST be very clear as to where your answer is; you MUST show all work (providing only the answer is not enough).

1) The inverse demand curve for good X is given by: $P_X = 25 - 0.005Q + 0.15P_C$, where $P_X$ represents price of X, Q represents sales in kgs per week, and $P_C$ represents the price of good C. The inverse supply curve of product X is given by: $P_X = 5 + 0.004Q$.

a. Determine the equilibrium price and quantity of X. Let $P_C = \$10$. (4 marks)

$25 - 0.005Q + 0.15(10) = 5 + 0.004Q$

$26.5 - 5 = 0.009Q \quad \therefore \quad Q = \frac{21.5}{0.009} = 2388.89$

$\therefore P_X = 5 + 0.004(2388.89) = 14.56$

b. Are X and C substitutes, complements or unrelated? Explain. (2 marks)

look at $P_X = 25 - 0.005Q + 0.15P_C$

we see that $\frac{dP_X}{dP_C} > 0 \Rightarrow P_X \uparrow$ if $P_C \uparrow$ ceteris paribus

this means that X and C are substitutes.

(if $P_C \uparrow \Rightarrow D_X \uparrow \Rightarrow P_X \uparrow$)

2) The demand for tickets to a sports event is given by: $Q^D = 350{,}000 - 800P$. The supply of tickets to this event is given by the capacity of the stadium, which is 150,000.

a. What is the equilibrium price of tickets to the event? (2 marks)

$$350000 - 800P = 150000$$
$$200000 = 800P$$
$$P = 250$$

b. What is the price elasticity of demand at the equilibrium price? (3 marks)

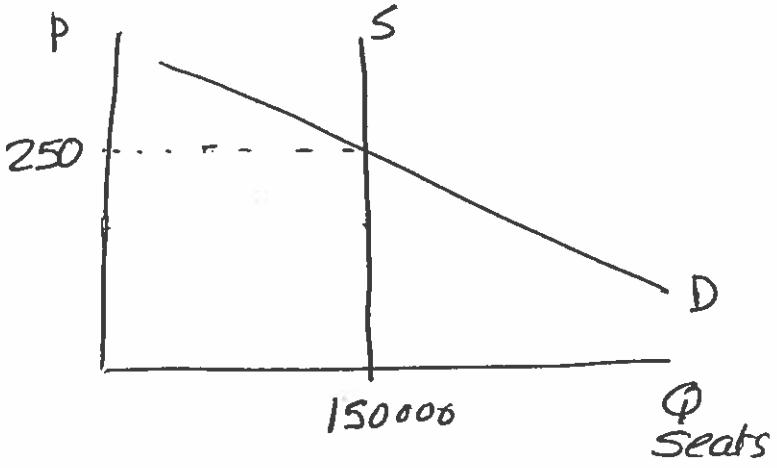
$$\frac{dQ^D}{dP} \cdot \frac{P}{Q} = -800\left(\frac{250}{150000}\right) = -1.33.$$

c. What is the price elasticity of supply at the equilibrium price? (2 marks)

$$\frac{dQ^S}{dP} \cdot \frac{P}{Q} = 0$$ Supply does not respond to price (it's fixed!)

**Question continues on next page ...**

d. Draw a graph of demand and supply and show what happens if the government imposes a tax of $10 per ticket on the owner of the stadium. (2 marks)




If tax ⇒ supply stays at 150,000.
– graph doesn't change.

e. What will happen to the price paid by consumers and who pays the tax? (2 marks)

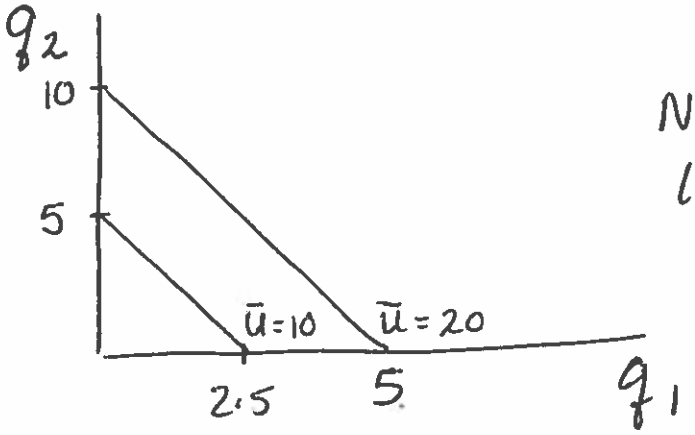
Consumers continue to pay $250 and producers pay all of the tax. They get 250 per seat then pay $10 per seat to gov't.

3. David's utility function is $U = q_1 + 2q_2$.

a. Sketch a graph of the indifference curve when U=10 and when U=20 (you have to draw two indifference curves). (3 marks)

$U = q_1 + 2q_2 = 10 \quad 2q_2 = 10 - q_1 \quad q_2 = 5 - \frac{1}{2}q_1$ (1)

$q_1 + 2q_2 = 20 \quad 2q_2 = 20 - q_1 \quad q_2 = 10 - \frac{1}{2}q_2$ (2)




Note that these are linear (perfect subs).

b. Describe David's optimal bundle of these two goods in terms of the prices of $q_1$ and $q_2$. (3 marks)

general rule: $MRS = \frac{P_1}{P_2}$ MRS = slope Indifference curve.

In this case, because the goods are perfect substitutes the consumer will chose either $q_1$ or $q_2$ depending upon if $MRS \gtrless \frac{P_1}{P_2}$ and it is any combination

if $MRS = \frac{P_1}{P_2} \Rightarrow$ any combination $q_1 + q_2$ that respects budget line.

if $\frac{P_1}{P_2} > \frac{1}{2}$ then it is better to choose $q_2$ (higher Utility; $P_1$ is too expensive)

alternatively if $1/2 < P_1/P_2 \Rightarrow$ only $q_2$

if $\frac{1}{2} > MRS$ $\left[\frac{P_1}{P_2} < \frac{1}{2}\right]$ then only $q_1$