

Economics 101	Name <u>ANNOTATED KEY</u>
Fall 2018	TA Name _____
November 27, 2018	Discussion Section # _____
Second Midterm	Student ID # _____

Version 1

**DO NOT BEGIN WORKING UNTIL THE INSTRUCTOR TELLS YOU TO DO SO.
READ THESE INSTRUCTIONS FIRST.**

You have 75 minutes to complete the exam, including filling in your scantron. The exam consists of 9 binary choice questions worth 2 points each and 20 multiple choice questions worth 4 points each. Please accurately and completely provide your name, ID number, discussion section number, version number, and TA name on the scantron sheet and the exam booklet. Writing all this information correctly is worth 2 points. Answer all questions on the scantron sheet with a #2 pencil. There are 18 printed pages in this exam, including this cover sheet. **DO NOT PULL THE EXAM APART OR REMOVE THE STAPLE.**

WARNING: NO COMMUNICATION OR CALCULATING DEVICES, OR FORMULA SHEETS ARE ALLOWED. NO CONSULTATION AND CONVERSATION WITH OTHERS ARE ALLOWED WHILE YOU ARE TAKING THE EXAM OR IN THE EXAM ROOM. ACADEMIC MISCONDUCT IS A SERIOUS OFFENSE AND PUNISHABLE TO THE FULLEST EXTENT. PICK THE BEST ANSWER FOR EACH QUESTION.

How to fill in the scantron sheet and other information:

1. Print your last name, first name, and middle initial in the spaces marked "Last Name," "First Name," and "MI." Fill in the corresponding bubbles below.
 2. Print your student ID number in the space marked "Identification Number." Fill in the bubbles.
 3. Write the number of the discussion section you've been attending under "Special Codes" spaces ABC, and fill in the bubbles. The discussion numbers can be found at the bottom of this page.
 4. Write the version number of your exam booklet under "Special Codes" space D, and fill in the bubble. The version number is at the top of this page.
- If there is an error on the exam or you do not understand something, make a note on your exam booklet and the issue will be addressed AFTER the examination is complete. No questions regarding the exam can be addressed while the exam is being administered.
 - When you are finished, please get up quietly and bring your scantron sheet and this exam booklet to the place indicated by the instructors.

Laura Boisten	Yulia Dudareva	Erlan Konebayev	Hoyoung Yoo	Wentao Zhou
301 Thurs 3:30 PM Social Sciences 6314	307 Fri 11:00 AM Van Vleck B139	304 Fri 12:05 PM Van Hise 475	303 Fri 1:20 PM Van Vleck B235	302 Fri 2:25 PM Sterling 2323
306 Thurs 4:35 PM Social Sciences 6322	311 Fri 9:55 AM Van Hise 474	308 Fri 8:50 AM Sterling 2333	305 Fri 12:05 AM Van Hise 395	313 Fri 8:50 AM Van Vleck B219
312 Fri 9:55 AM Van Hise 590		309 Fri 11:00 AM Van Vleck B135	310 Fri 11:00 AM Van Vleck B123	314 Fri 1:20 PM Ingraham 120

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EXAM CONTINUES ON NEXT PAGE

I, _____, agree to neither give nor receive any help on this exam from others. I understand that the use of a calculator or communication device on this exam is academic misconduct. I also understand that providing answers to questions on this exam to other students is academic misconduct, as is taking or receiving answers to questions on this exam from other students. Thus, I will cover my answers and not expose my answers to other students. It is important to me to be a person of integrity and that means ALL ANSWERS on this exam are my answers. Any violation of these guidelines will result in a penalty of at least receiving a zero on this exam.

Signed _____

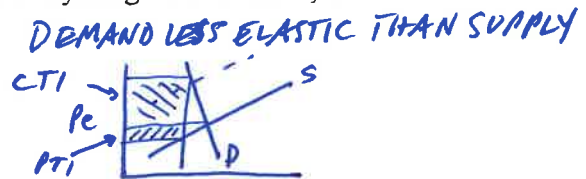
Binary Choice (9 Questions @ 2 Points Each for a Total of 18 Points)

NOT TOO HARD

1. To increase tax revenue, the government decides to impose an excise tax. Suppose you are told that the price elasticity of demand is less than the price elasticity of supply. Given this information and holding everything else constant, who will bear the larger part of the tax burden?

- a. Consumers
b. Producers

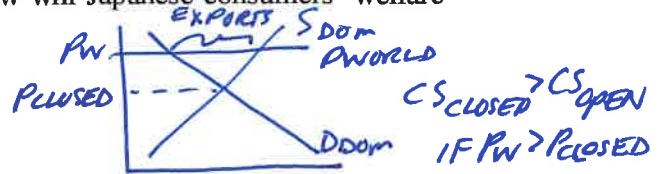
$CTI > PTI$



NOT HARD

2. Assume that Japan is an exporter of machinery. If at some point international trade becomes impossible for Japan in this market, how will Japanese consumers' welfare change?

- a. Japanese consumer welfare will increase.
b. Japanese consumer welfare will decrease.



NOT TOO BAD

3. James will increase the quantity of haircuts he consumes by 10% if his income increases by 5%. And, if his price of fine shampoo increases by 20%, he will decrease his demand for haircuts by 10%. From information we can conclude that for James:

- a. Haircuts are a normal good, and haircuts and fine shampoo are complements.
b. Haircuts are an inferior good, and haircuts and fine shampoo are substitutes.

INC ↑ BY 5%, Q HAIRCUTS ↑ 10% ⇒ HAIRCUTS ARE NORMAL ⇒ ANSWER MUST BE (a)

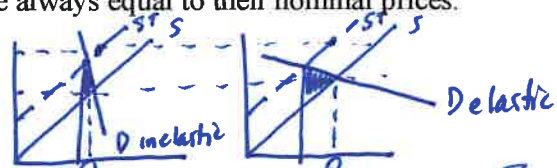
GROSS PRICE ELASTICITY OF DEMAND = $\frac{\% \Delta Q_{\text{HAIRCUTS}}}{\% \Delta P_{\text{SHAMPOO}}} = \frac{-10\%}{20\%} = -\frac{1}{2}$

AS P SHAMPOO ↑, Q HAIRCUTS ↓ ⇒ GOODS ARE COMPLEMENTS

EASY -
DEFINITIONAL

4. In the base year, the real prices of goods are always equal to their nominal prices.

- (a) True
- b. False



NOT HARD

5. Consider an excise tax applied on a good with a linear supply curve. Suppose there are two demand curves going through the initial equilibrium point. For a given excise tax, the demand curve that is more elastic will have:

- a. Greater consumer tax incidence and smaller deadweight loss than is seen with the demand curve that is more inelastic.
- (b) Smaller consumer tax incidence and greater deadweight loss than is seen with the demand curve that is more inelastic.

DEFINITIONAL -
EASY

6. The Average Total Cost (ATC) curve and the Average Variable Cost (AVC) curve intersect the Marginal Cost (MC) Curve at their _____ points.

- (a) Minimum
- b. Maximum

EASY

7. In a perfectly competitive industry, entry of firms will occur until

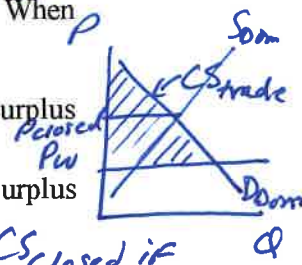
- (a) Each firm in the industry earns zero economic profits in the long run.
- b. Marginal cost equals marginal revenue at each firm's level of production.

↳ THIS IS TRUE IN SR & LR & IS NOT ABOUT ENTRY ⇒ ITS THE PROFIT MAXIMIZATION RULE

EASY -

8. The domestic price of corn in Malaysia is higher than the world price of corn. When Malaysia opens its corn market to trade,

- (a) Domestic consumer surplus increases and domestic producer surplus decreases.
- b. Domestic consumer surplus decreases and domestic producer surplus increases.



$CS_{trade} > CS_{closed}$ if $P_w < P_{closed}$

NOT HARD

9. If Anna, an owner of a flower kiosk, increases the price of tulips by 10%, the quantity of tulips demanded falls by 15%. Given this information and holding everything else constant, what should Anna do in order to increase her total revenue?

- a. Anna should increase the price of tulips.
- (b) Anna should decrease the price of tulips.

$$\epsilon^D = \left| \frac{\% \Delta Q^D}{\% \Delta P} \right| = \left| \frac{-15\%}{10\%} \right| > 1 \Rightarrow \text{To } \uparrow \text{TR, } \downarrow P$$

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Multiple Choice (20 Questions @ 4 Points Each for a Total of 80 Points)

Use the following information to answer the next two (2) questions.

Consider a perfectly competitive industry where all firms are identical. For a representative firm, the average total cost function is given by the following equation where q is the quantity produced by the firm:

$$\text{Average Total Cost Curve for the firm: } ATC = 2q + \frac{8}{q}$$

The firm's marginal cost is described by the linear function:

$$\text{Marginal Cost Curve for the firm: } MC = 4q$$

NOT HARD

10. Given that the firm is producing at its break-even (i.e. zero economic profits) point, what is the quantity the firm produces (q) and what is the firm's total cost (TC) at that quantity?

- a. $q = 2$ units, $TC = \$16$
- b. $q = 4$ units, $TC = \$32$
- c. $q = 8$ units, $TC = \$64$
- d. $q = 16$ units, $TC = \$128$

AT BREAK-EVEN POINT $ATC = MC$

$$2q + \frac{8}{q} = 4q$$

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

$$8 = 2q^2$$

$$4 = q^2$$

$$2 = q$$

\Rightarrow ANSWER MUST BE (a)
CAN STOP HERE!

BUT, HERE'S THE REST OF THE PROOF:
 $ATC = \frac{TC}{q}$
 $2q + \frac{8}{q} = \frac{TC}{q}$
 $\rightarrow TC = 2(2)^2 + 8 = 16$
 $TC = 2(4) + 8 = 32$
 $TC = 8$

SOME THINKING INVOLVED ON THIS ONE

11. Now assume that the market demand curve shifts to the left. Given the above information and holding everything else constant, we are told that this representative firm decreases its level of production relative to its initial level of production described in the previous question. In the short run, if we know that the firm is still in the market after this change in production, what is the possible range of values for the quantity, q , produced by this firm?

- a. $q \geq 0$
- b. $q \geq 1$
- c. $q \geq 4$
- d. $q \geq 2$

FIRM WILL PRODUCE AT $P \geq AVC$

FIND WHERE $AVC = MC$

$$TC = 2q^2 + 8 \text{ (FROM LAST QUESTION)}$$

$$TC = VC + FC$$

$$VC = 2q^2 \quad FC = 8$$

$$AVC = 2q$$

$$AVC = MC$$

$$2q = 4q$$

$$q = 0$$

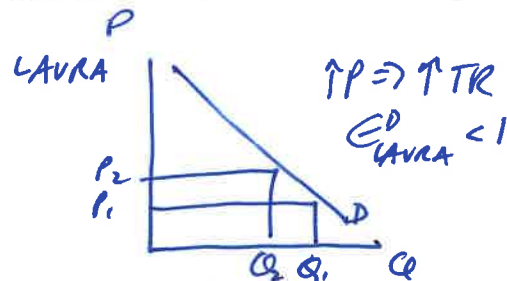
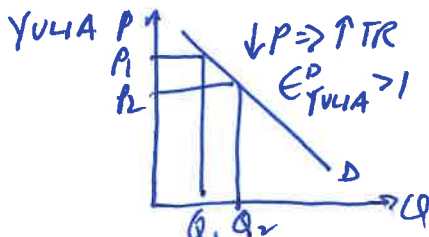
[ONLY q WHERE $2q = 4q$]

SO IF $q \geq 0$ FIRM WILL PRODUCE IN SR

NOT TOO
BAD

12. Yulia and Laura have a winery and sell bottles of wine. In order to increase their revenue, they want to change the price they charge for a bottle of their wine. Yulia says decreasing the price they charge for their wine will increase their revenue. Laura believes that increasing the price they charge for their wine will increase their revenue. Which of the following price elasticities of demand would support Yulia's claim and Laura's claim, respectively?

- a. Yulia believes the price elasticity of demand is 2 and Laura believes the price elasticity of demand is 1. ~~X~~
- b. Yulia believes the price elasticity of demand is 1 and Laura believes the price elasticity of demand is 2. ~~X~~
- c. Yulia believes the price elasticity of demand is 0.5 and Laura believes the price elasticity of demand is 3. ~~X~~
- d. Yulia believes the price elasticity of demand is 3 and Laura believes the price elasticity of demand is 0.5. ✓



SOME
WORK

13. Find the highest Utility Erlan can receive from spending his entire income only on chocolate and brownies. Use the following information to answer this question:

Price of one bar of chocolate: \$4

Price of one brownie: \$1

Income: \$24

Utility Equation: $Utility = Chocolate^2 \times Brownies$

Marginal Rate of Substitution of Chocolate for Brownies = $MRS_{CB} =$

$$= \frac{MU_C}{MU_B} = \frac{2 \text{ Brownies}}{\text{Chocolate}}$$

- a. Utility = 64 utils
- b. Utility = 512 utils
- c. Utility = 256 utils
- d. Utility = 128 utils

$$\left. \begin{array}{l} P_C = 4 \\ P_B = 1 \\ Inc = 24 \end{array} \right\} BL: \boxed{24 = 4C + B}$$

USE THE 2 EQUATIONS
TO FIND (C, B):

$$24 = 4C + 2C$$

$$24 = 6C$$

$$4 = C$$

$$8 = 2(4) = B$$

$$(C, B) = (4, 8)$$

$$U = C^2 B = (4)^2 8$$

$$U = 16(8) = 128 \text{ UTILS}$$

$$MU_C = 2B$$

$$MU_B = C$$

$$\frac{MU_C}{P_C} = \frac{MU_B}{P_B}$$

$$\frac{2B}{4} = \frac{C}{1}$$

$$\boxed{B = 2C}$$

Use the following information to answer the next two (2) questions.

Consider the avocado market in the United States described by the following equations where P is the price per pound of avocados and Q is the quantity of avocados in pounds:

Domestic Supply Curve: $Q = 2P - 15$

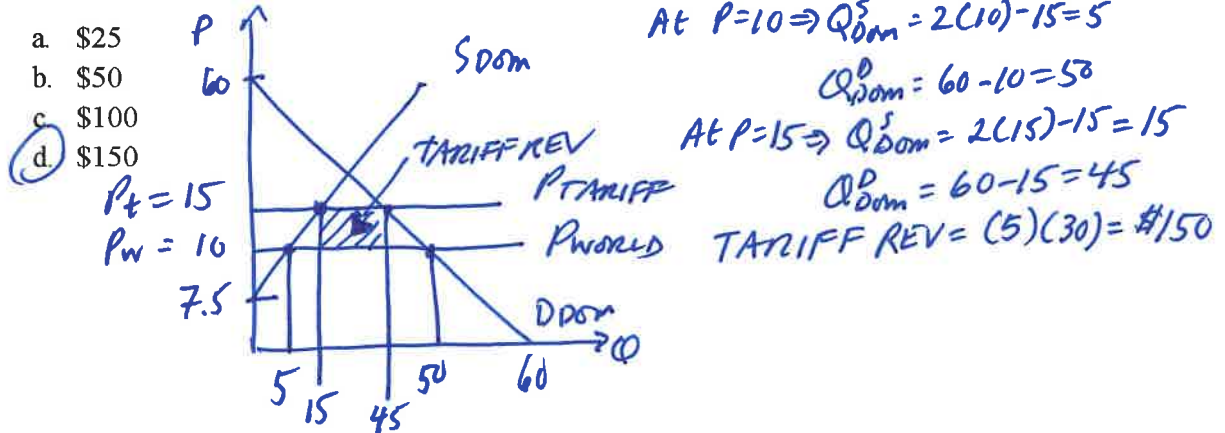
$2P = Q + 15$
 $P = \frac{1}{2}Q + 7.5$

Domestic Demand Curve: $Q = 60 - P \rightarrow P = 60 - Q$

The world price for avocados: $P_w = \$10$ per pound of avocados

PREDICTABLE - NOT HARD

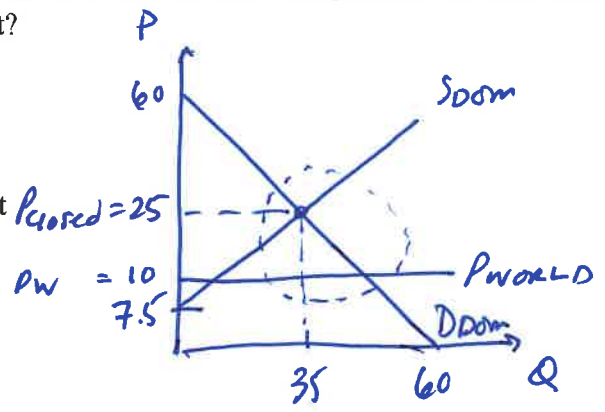
14. Suppose the U.S. government opens this market to trade while simultaneously imposing a tariff of \$5 per pound of avocados. Given this information and holding everything else constant, what would the tariff revenue be from this policy?



THIS COULD BE A VERY LONG & HARD QUESTION - SEE IF YOU FOLLOW MY REASONING!

15. Suppose the government's first objective from imposing a tariff on avocados is to maximize the government's revenue from this tariff. Given this information and holding everything else constant, what level of tariff will generate the maximum tariff revenue possible in this market?

- a. Tariff = \$2.50 per unit
- b. Tariff = \$5.00 per unit
- c. Tariff = \$7.50 per unit
- d. Tariff = \$10.00 per unit



CLOSED ECONOMY:

$\frac{1}{2}Q + 7.5 = 60 - Q$
 $\frac{3}{2}Q = 52.5$
 $Q = \frac{52.5(2)}{3}$
 $Q_{closed} = \frac{105}{3} = 35$
 $P_{closed} = 60 - Q = 60 - 35 = 25$

USE E^D CONCEPT TO GET YOUR ANSWER! FOCUS ON THE CIRCLED AREA. TRANSPOSE THE AXIS OVER - WHERE WOULD REVENUE BE MAXIMIZED → BY CHARGING A PRICE HALFWAY B/W 10 AND \$25 ⇒ \$17.50!

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Use the following information to answer the next two (2) questions.

A consumer is facing a consumption problem involving two perfect complements, coffee and sugar, which he prefers to consume in the strict ratio of 2 cups of coffee to one unit of sugar. The income he has available to spend on these two goods is \$168. You are also told that the price of a cup of coffee is initially \$6 and the price of a unit of sugar is \$2. The price of coffee falls to \$3 per cup at some point allowing the consumer to afford a larger consumption bundle than they could initially.

NOT THAT BAD - ACTUALLY VERY EASY => CONSUMER CANNOT AFFORD (b), (c) or (d)!

16. Given the above information and holding everything else constant, find the quantities of coffee and sugar that the consumer will buy after the change in the price of coffee occurs.

- a. $q_{coffee} = 42$ cups of coffee, $q_{sugar} = 21$ units of sugar
- b. $q_{coffee} = 24$ cups of coffee, $q_{sugar} = 12$ units of sugar
- c. $q_{coffee} = 82$ cups of coffee, $q_{sugar} = 41$ units of sugar
- d. $q_{coffee} = 112$ cups of coffee, $q_{sugar} = 56$ units of sugar

$P_{coffee} = 6$
 $P_{sugar} = 2$

$P_{coffee}' = 3$
 $P_{sugar} = 2$

$\frac{21}{8} \sqrt{168}$

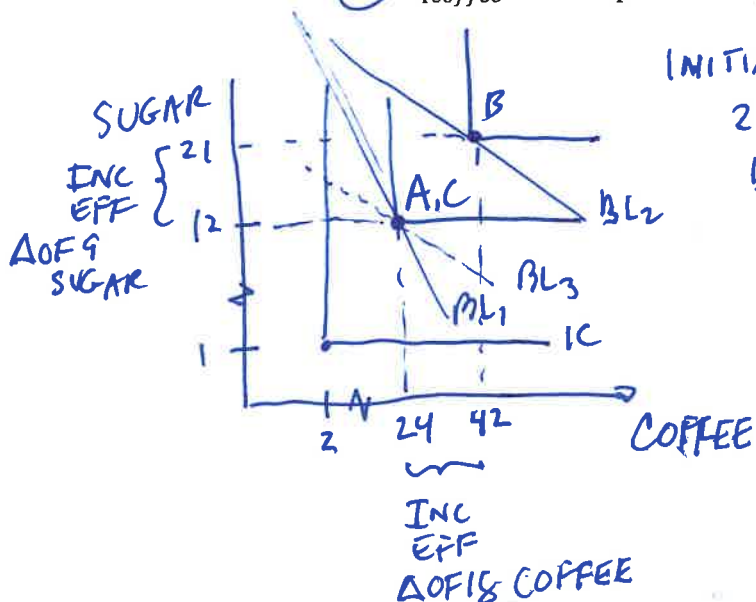
2 cups of coffee to 1 unit of sugar } COSTS \$8 DOLLARS
 } So 2 cups of coffee + 1 unit of sugar }
 => SHE CAN CONSUME 21 UNITS WHERE EACH UNIT HAS 2 CUPS OF COFFEE + 1 UNIT OF SUGAR => 42 CUPS OF COFFEE + 21 UNITS OF SUGAR

THIS IS CONCEPTUALLY MORE CHALLENGING

17. Now, given the above information and holding everything else constant, find the difference in the quantities consumed of the two goods associated with the income effect.

- a. $\Delta q_{coffee} = 10.5$ cups of coffee, $\Delta q_{sugar} = 4.5$ units of sugar
- b. $\Delta q_{coffee} = 12$ cups of coffee, $\Delta q_{sugar} = 9$ units of sugar
- c. $\Delta q_{coffee} = 9$ cups of coffee, $\Delta q_{sugar} = 4.5$ units of sugar
- d. $\Delta q_{coffee} = 18$ cups of coffee, $\Delta q_{sugar} = 9$ units of sugar

DON'T NEED TO CONSIDER Δ IN SUGAR



INITIALLY $168 = 6C + 2S$

2 CUPS OF COFFEE + 1 SUGAR COSTS \$14

$\frac{168}{14} = 12$ UNITS SHE CAN AFFORD

↳ 24 CUPS OF COFFEE + 12 UNITS OF SUGAR

A TO B IS ALL INCOME EFFECT => W/ PERFECT COMPLEMENTS THERE IS NO SUBSTITUTION EFFECT

Use the following information to answer the next two (2) questions.

Consider the market for gasoline. The supply and demand curves are given by the following equations where quantity (Q) is measured in gallons and price (P) is measured in dollars per gallon:

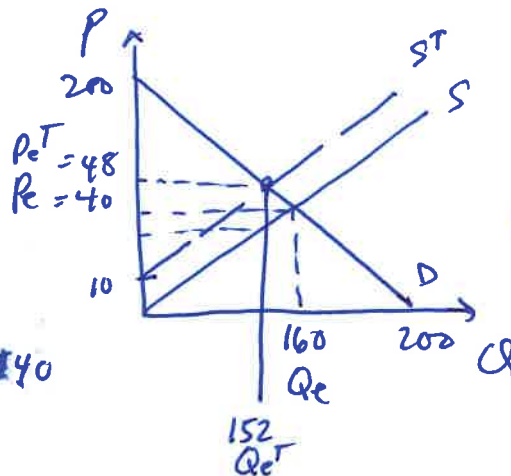
Supply Curve for Gasoline: $Q = 4P \rightarrow P = \frac{1}{4}Q$

Demand Curve for Gasoline: $Q = 200 - P \rightarrow P = 200 - Q$

SOME WORK - NOT HARD

18. Suppose the government implements an excise tax of \$10 per gallon of gasoline in this market. What is the deadweight loss arising from the implementation of this excise tax?

- a. \$30
- b. \$40
- c. \$50
- d. \$60



$$4P = 200 - P$$

$$5P = 200$$

$$P = 40$$

$$Q = 4(40) = 160$$

W/ TAX: $ST: P = \frac{1}{4}Q + 10$

$$D: P = 200 - Q$$

$$\frac{1}{4}Q + 10 = 200 - Q$$

$$\frac{5}{4}Q = 190$$

$$Q_e^T = \frac{190(4)}{5} = 38(4) = 152$$

$$DWL = \frac{1}{2}bh$$

$$DWL = \frac{1}{2}(10)(8) = 40$$

SOMEWORK - PREDICTABLE

19. The tax revenue for the government after implementing this excise tax is _____. Of this tax revenue, _____ is the consumer tax incidence.

- a. \$980; \$304
- b. \$1,520; \$304
- c. \$1,500; \$1,216
- d. \$1,520; \$1,216

$$TAX\ REVENUE = (TAX/UNIT)(Q_{e^T})$$

$$TAX\ REVENUE = (\$10/UNIT)(152\ UNITS)$$

$$TAX\ REVENUE = \$1520$$

\Rightarrow ELIMINATES (a) & (c)

CTI \Rightarrow P_{e^T} REQUIRED

SO, $P_{e^T} = 200 - Q_{e^T}$

$$P_{e^T} = 200 - 152 = 48$$

$$CTI = (P_{e^T} - P_e)(Q_{e^T})$$

$$= (48 - 40)(152)$$

$$= 8(152)$$

$$= \$1216$$

$$\frac{152}{8}$$

$$1216$$

Use the following information to answer the next three (3) questions.

In a perfectly competitive industry, all the potential firms have identical technology and, thus, the same cost function. You are provided with the following information about each of the identical firms in the industry where q is the quantity produced by each firm:

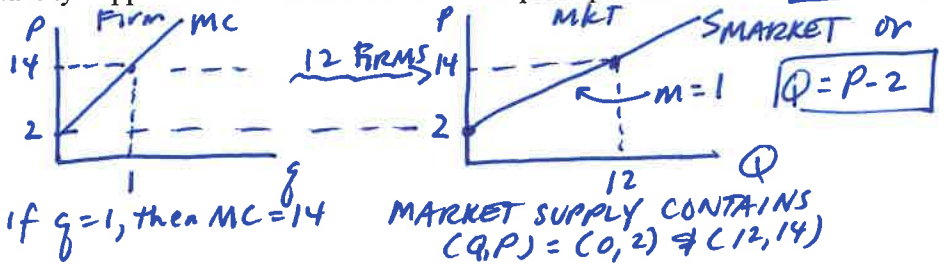
Total cost for a representative firm: $TC = 6q^2 + 2q + 96$

Marginal Cost for a representative firm: $MC = 12q + 2$

HARDER - BUT NOT THAT HARD

20. Suppose there are 12 identical firms in this market in the short run. Given this information and holding everything else constant, derive the short run market supply curve where Q is the quantity supplied in the market and P is the price per unit of the good.

- a. $Q = P - 2$
- b. $Q = P + 2$
- c. $Q = P/12 - 1/6$
- d. $Q = 2P - 1$



Suppose you are also told that the market demand can be described by the following equation where P is the price per unit and Q is the quantity in the market:

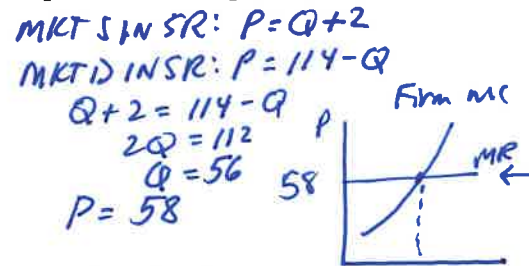
Market Demand Curve: $P = 114 - Q_d$

Recall that in the short run, firms cannot enter the market and, hence, the number of firms will be 12 firms in the short run.

SOMEWORK

21. Given this information and holding everything else constant, in the short run, how many units does each firm produce? Does each firm earn positive or negative economic profit in the short run?

- a. $q = 56$ units of the good, positive economic profit
- b. $q = 14/3$ units of the good, positive economic profit
- c. $q = 58$ units of the good, negative economic profit
- d. $q = 29/6$ units of the good, negative economic profit



SOMEWORK

22. Given all of the above information and holding everything else constant, the long run market equilibrium price is _____. Each firm in the market produces ____ units of output. The number of firms producing in this industry in the long run is equal to _____.

- a. $P = \$50$ per unit of the good; $q = 4$ units of output; 16 firms
- b. $P = \$50$ per unit of the good; $q = 6$ units of output; 16 firms
- c. $P = \$62$ per unit of the good; $q = 5$ units of output; 13 firms
- d. $P = \$62$ per unit of the good $q = 4$ units of output; 13 firms

LR MKT Eq. PRICE: IN LR, $ATC = MC$

$$ATC = 6q + 2 + \frac{96}{q}$$

$$ATC = MC$$

$$6q + 2 + \frac{96}{q} = 12q + 2$$

$$\frac{96}{q} = 6q$$

$$96 = 6q^2$$

$$16 = q^2$$

$$4 = q$$

if $q = 4$

$$P = MC = 12(4) + 2$$

$$P = 50$$

Page 12 of 18 MKT DEMAND

$$50 = 114 - Q_D$$

$$Q_D = 64$$

$$\frac{Q_D}{q} = \frac{64}{4} = 16 \text{ firms}$$

$MR = MC$

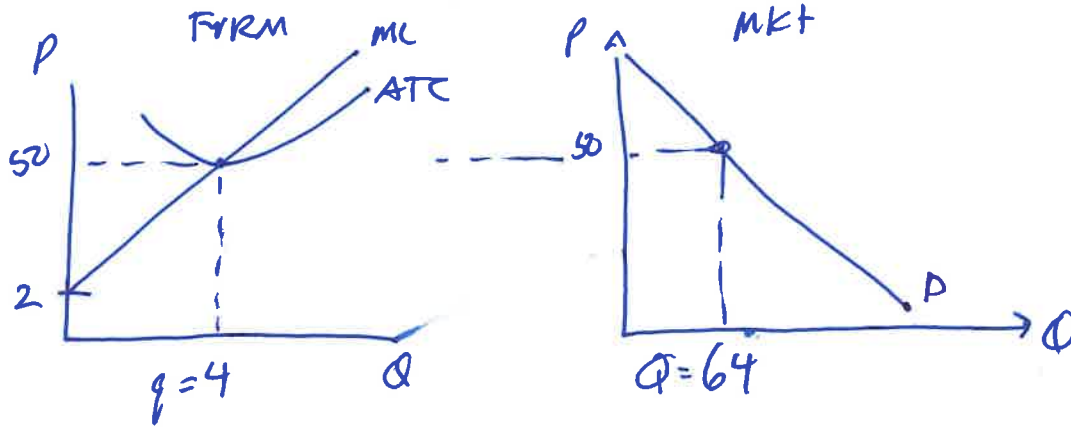
$$58 = 12q + 2$$

$$56 = 12q$$

$\frac{14}{3} = \frac{28}{6} = \frac{56}{12} = q \Rightarrow (b)!$ STOP HERE

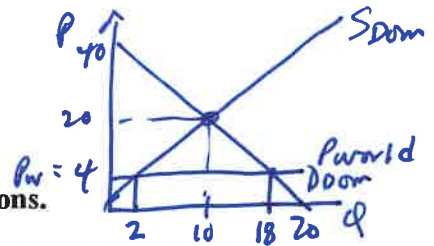
$A + P = 4 \Rightarrow$

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$$\frac{Q^D}{q} = \text{\# OF FIRMS IN MARKET}$$

$$\frac{64}{4} = 16 \text{ FIRMS}$$



Use the following information to answer the next two (2) questions.

The domestic demand and domestic supply for fish in the Principality of Sealand is given by the following equations where P is the price per unit of fish and Q is the number of units of fish:

Domestic Supply Curve: $Q = 0.5P \rightarrow P = 2Q$

Domestic Demand Curve: $Q = 20 - 0.5P \rightarrow \frac{1}{2}P = 20 - Q$
 $P = 40 - 2Q$

$40 - 2Q = 2Q$
 $40 = 4Q$
 $10 = Q$

The price of fish in the world market is \$4 per unit of fish. Due to Sealand's small size, Sealand's activities have no impact on the world price of fish.

IF $P = 12$ W/ QUOTA, REVENUE WILL BE MAXIMIZED \Rightarrow USING
 \Rightarrow HERE TO GET THIS OUTCOME \Rightarrow IF $P_{QUOTA} = 12 \Rightarrow Q^D = 14$ &
 $Q^S = 6$

IF YOU ARE COMFORTABLE APPLYING \Rightarrow KNOWLEDGE THIS IS NOT TOO HARD \Rightarrow MUCH HARDER IF YOU CALCULATE THE POTENTIAL REVENUE FROM EACH IMPORT QUOTA

23. The prince of Sealand decides to impose an import quota on fish. He plans to sell the import license at a price that maximizes the revenue he gets from the proposed import quota. Given this information and holding everything else constant, what should the import quota be?

\Rightarrow IMPORT QUOTA OF 8 UNITS

- a. An import quota of 4 units of fish will maximize the revenue from selling the import license.
- b. An import quota of 6 units of fish will maximize the revenue from selling the import license.
- c. An import quota of 8 units of fish will maximize the revenue from selling the import license.
- d. An import quota of 10 units of fish will maximize the revenue from selling the import license.

NOT TOO BAD

24. Due to complaints from the people of Sealand, the prince is forced to change the import quota on fish, such that the new import quota maximizes consumer surplus. To maximize consumer surplus, the new import quota level should be set at:

- a. 0 units of imported fish.
- b. 6 units of imported fish.
- c. 12 units of imported fish.
- d. 16 units of imported fish.

IF $P_{QUOTA} = P_{WORLD} = 4$ THIS WILL MAXIMIZE CONSUMER SURPLUS

AT $P = 4 \Rightarrow Q^S = \frac{1}{2}(4) = 2$

$Q^D = 20 - \frac{1}{2}(4) = 20 - 2 = 18$

SET IMPORT QUOTA AT $Q^D - Q^S = 18 - 2 = 16$

Use the following information to answer the next two (2) questions.

Consider the planet "Chocolate" whose economic data is provided in the following table. Use 2050 as the base year in all your calculations.

Year	Cost of Market Basket Used in Calculating the CPI	Nominal Hourly Wage of Chocolate Factory Workers	Nominal Price of Dark Chocolate	Nominal Price of Milk Chocolate	Nominal Price of White Chocolate
2050	\$10.00	\$4.00	\$8.00	\$2.00	\$5.00
3050	\$80.00	\$16.00	\$8.00	\$24.00	\$40.00

SOME WORK- AND KNOWLEDGE REQUIRED- NOT HARD

25. Given the above information and holding everything else constant, what is the percentage change in the real hourly wage of chocolate factory workers from 2050 to 3050? The real wage:

- a. Increases by 50%.
- b. Increases by 300%.
- c. Decreases by 50%.
- d. Decreases by 300%.

YEAR	CPI BY 2050	YEAR	NOM WAGE	REAL WAGE
2050	100	2050	4	4
3050	$\frac{80}{10}(100) = 800$	3050	16	2

$$\% \Delta \text{ IN REAL WAGE} = \left[\frac{2-4}{4} \right] 100\% = -50\%$$

$$\text{real wage} = \frac{16}{800} (100) = 2$$

CAREFUL HERE! LOOKING FOR LARGEST % INCREASE! SOME WORK.

26. Given the above information and holding everything else constant, which type of chocolate experienced the largest percentage increase in real prices between 2050 and 3050?

- a. Dark Chocolate experienced the largest percentage increase in real price between 2050 and 3050.
- b. Milk Chocolate experienced the largest percentage increase in real price between 2050 and 3050.
- c. White Chocolate experienced the largest percentage increase in real price between 2050 and 3050.
- d. Dark, Milk and White chocolate all experienced a decrease in real prices between 2050 and 3050.

YEAR	NOM P DARK	REAL P DARK	NOM P MILK	REAL P MILK	NOM P WHITE	REAL P WHITE
2050	8	8	2	2	5	5
3050	8	$\frac{8(100)}{800} = 1$	24	$\frac{24(100)}{800} = 3$	40	$\frac{40(100)}{800} = 5$

$$\% \Delta = \left(\frac{1-8}{8} \right) (100\%) = -\frac{700}{8}\% = -87.5\%$$

% DECREASE!

$$\% \Delta = \frac{3-2}{2} (100\%) = 50\%$$

% INCREASE

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% Δ HERE = 0%

NOT HARD -
JUST A
BIT
OF
WORK

27. A shoe factory has a total cost function given by the following equation where q is the quantity of pairs of shoes:

$$\text{Total Cost for firm: } TC = 5q^2 + 4q$$

You are told that only labor is required for production of shoes, and the wage for each unit of labor is \$7. Using this information and the total cost function, how many units of labor does the factory need to hire in order to produce 2 pairs of shoes?

- a. 2 units of labor
b. 3 units of labor
c. 4 units of labor
d. 5 units of labor

$$\text{If } q = 2$$

$$TC = 5(2)^2 + 4(2)$$

$$TC = 5(4) + 8 = 28$$

$$TC = \# \text{ SPENT ON LABOR}$$

$$\# \text{ SPENT ON LABOR} = P_L (\# \text{ OF UNITS OF LABOR})$$

$$\# 28 = \# 7 (\# \text{ OF UNITS OF LABOR})$$

$$4 = \# \text{ OF UNITS OF LABOR}$$

PREDICTABLE:
EASY

28. The market demand for oranges in Wisconsin is given by the following equation where P is the price per unit of oranges and Q is the quantity of units of oranges:

$$\text{Market Demand: } Q = 100 - 0.25P$$

Consider two points on the demand curve for oranges in Wisconsin. At point A, the price for oranges is \$100 per unit of oranges, and at point B the price for oranges is \$300 per unit of oranges. Using the arc elasticity formula, calculate the price elasticity of demand for oranges between point A and point B.

- a. 0.33
b. 1
c. 1.5
d. 3

$$\begin{aligned} \text{Pt. A: } P_1 &= 100 \\ Q &= 100 - \frac{1}{4}(100) \\ Q_1 &= 75 \end{aligned}$$

$$\begin{aligned} \text{Pt. B: } P_2 &= 300 \\ Q &= 100 - \frac{1}{4}(300) \\ Q_2 &= 25 \end{aligned}$$

$$E_D = \left| \frac{\frac{Q_2 - Q_1}{Q_2 + Q_1}}{\frac{P_2 - P_1}{P_2 + P_1}} \right| = \left| \frac{\frac{25 - 75}{25 + 75}}{\frac{300 - 100}{300 + 100}} \right| = \left| \frac{\frac{-50}{100}}{\frac{200}{400}} \right| = \frac{\frac{1}{2}}{\frac{1}{2}} = 1$$

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DO NOT DETACH THIS SHEET FROM THIS EXAM BOOKLET!
EXAM CONTINUES ON NEXT PAGE

SOME WORK & A LOT OF UNDERSTANDING OF THE MATERIAL REQUIRED

29. Eric's utility function is given by the following equation:

$$U(x, y) = xy$$

This equation tells us that Eric's Utility, U , is dependent upon how much of good X and good Y he consumes. You are also told that Eric's marginal utility from consuming an additional unit of good X and his marginal utility from consuming an additional unit of good Y are given by the equations:

$$MU_x = y$$

$$MU_y = x$$

Suppose you know that Eric maximizes his utility by choosing to consume 10 units of X and 20 units of Y. Given this information, which of the following combinations of prices and income are possible?

- a. $P_x = \$3$ per unit of good X, $P_y = \$3$ per unit of good Y and income = \$90
- b. $P_x = \$3$ per unit of good X, $P_y = \$1.50$ per unit of good Y and income = \$60
- c. $P_x = \$1.50$ per unit of good X, $P_y = \$3$ per unit of good Y and income = \$75
- d. $P_x = \$1.50$ per unit of good X, $P_y = \$1.50$ per unit of good Y and income = \$45

$$X = 10$$

$$Y = 20$$

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y}$$

$$\frac{Y}{P_x} = \frac{X}{P_y}$$

THIS MUST BE TRUE PER U MAXIMIZATION

$$P_x X + P_y Y = I$$

$$10P_x + 20P_y = I$$

WE ALSO KNOW THIS

END OF EXAM

BOTH EQUATIONS MUST BE TRUE AT THE SAME TIME:

X a) $P_x = 3, P_y = 3, I = 90$

$$\frac{Y}{3} = \frac{X}{3}$$

$Y = X$ THIS IS NOT TRUE SINCE $X = 10$ AND $Y = 20$

b) $P_x = 3, P_y = 1.50, I = 60$

$$\frac{Y}{1.5} = \frac{X}{3}$$

$1.5Y = 3X$ THIS IS TRUE FOR $X = 10$ AND $Y = 20$

$(10 \cdot 3) + 20(1.5) = 30 + 30 = 60$ THIS IS ALSO TRUE
STOP HERE IF CONFIDENT!

~~c) $P_x = 1.50, P_y = 3, I = 75$~~

$$\frac{Y}{1.5} = \frac{X}{3}$$

$3Y = 1.5X$ NOT TRUE FOR $X = 10$ AND $Y = 20$

~~d) $P_x = 1.50, P_y = 1.50, I = 45$~~

$$\frac{Y}{1.5} = \frac{X}{1.5}$$

$1.5X = 1.5Y$
 $X = Y$ NOT TRUE FOR $X = 10$ AND $Y = 20$