Version 1

DO NOT BEGIN WORKING UNTIL THE INSTRUCTOR TELLS YOU TO DO SO.
READ THESE INSTRUCTIONS FIRST.
YOU WILL RECEIVE 2 BONUS POINTS FOR FOLLOWING ALL DIRECTIONS
ON THIS COVER SHEET CORRECTLY.

You have 75 minutes to complete the exam, **including filling in your scantron and the exam booklet information at the top of this page.** The exam consists of 9 **binary choice questions worth 2 points each, and 20 multiple choice questions worth 4 points each for a total of 98 points.** 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 for an additional 2 points. Answer all questions on the scantron sheet with a #2 pencil. There are 26 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 (family) name and first (given) name, in the spaces marked "Last Name," and "First Name." 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.**

Gary Baker	Annie Lee	Zaure (April) Aitkulova	Yiyou Zhang
363 Tr 4:35-5:25 4314 Soc Sci	**370** F 12:05-12:55 586 Van Hise	**362** Tr 4:35-5:25 5322 Soc Sci	**367** F 9:55-10:45 240 Van Hise
365 F 11:00-11:50 390 Van Hise	**364** F 1:20-2:10 6322 Soc Sci	**368** F 8:50-9:40 6322 Soc Sci	**366** F 11:00-11:50 B325 Van Vleck
	360 F 2:25-3:15 4308 Soc Sci	**361** F 9:55-10:45 227 Van Hise	**369** F 12:05-12:55 144 Van Hise

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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 <u>at least</u> receiving a zero on this exam.

Signed _____

Binary Choice (9 questions worth 2 points each)

Challenging!
*lots of ways*
to get to
the "right"
answer

1) Consider the ice cream market in a small economy. Suppose domestic demand and domestic supply are both linear. When this market is opened to international trade, we find, if the world price of ice cream is $8, it will *export* 10 units of ice cream; if the world price of ice cream is $4, it will *import* 10 units of ice cream. Given this information and holding everything else constant, what is the domestic equilibrium price of ice cream when this market is in autarky?

a) $5
b) $6 ← (circled)

Not hard

2) Suppose the CPI this year is 157. Assume the CPI is measured on a 100-point scale. Given this information, which of the following statements is true?

a) The nominal price of the market basket used to construct the CPI is *greater* this year than the nominal price of the market basket in the base year. ← (circled)
b) The real value of $1 this year is *greater* than the real value of $1 in the base year.

1. Here's a geometric proof:
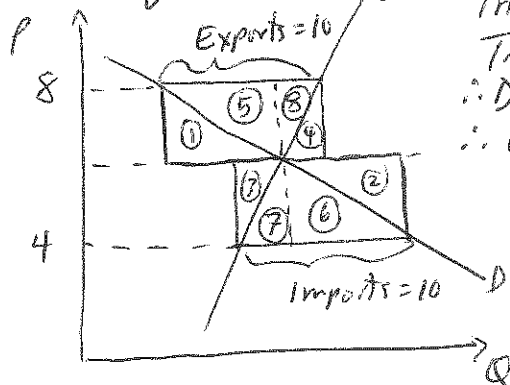
Triangles ① & ② are symmetric ⇒ also ⑤ & ⑥
Triangles ③ & ④ are symmetric ⇒ also ⑦ & ⑧
∴ Dotted vertical distances must be equal ⇒
∴ What is ½ of distance b/w #4 & #8 ⇒ #6

2. $CPI_{yrn} = \left[\dfrac{cost \ of \ mkt \ basket \ in \ yrn}{cost \ of \ mkt \ basket \ in \ base \ year} \right](scale)$

3) Suppose goods A and B are perfect substitutes (so 1 unit of A is always perfectly substitutable for 1 unit of B). Suppose Alice knows her budget line includes the bundle of 1 unit of A and 5 units of B and the bundle of 10 units of A and 1 unit of B. Given this information and holding everything else constant, what can we say about Alice's optimal consumption bundle?

(a) Alice will spend all of her budget on good A.
b) Alice will spend all of her budget on good B.

Not too hard

4) Suppose John is running the local gadget factory. He observes that, at the current level of production, if he increases the quantity produced, the factory's average variable costs increase. Given this information, which of the following must be true?

(a) At the current level of production, the factory's marginal cost is above its average variable costs.
b) At the current level of production, the factory's marginal cost is below its average variable costs.

4.
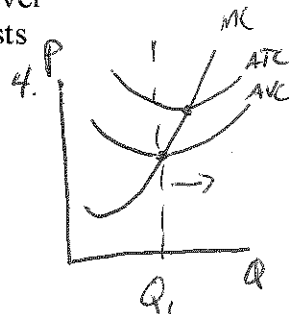
Not hard

5) Suppose in some market, the demand curve is twice as steep (in absolute value) as the supply curve. Then if the government implements an excise tax, which of the following statements will be true?

a) Consumer tax incidence will be half of the producer tax incidence.
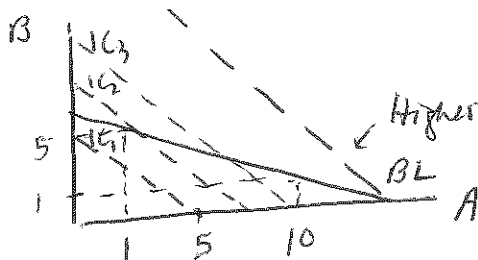(b) Consumer tax incidence will be double the producer tax incidence.

At quantities > Q_1, AVC is less than MC

5.
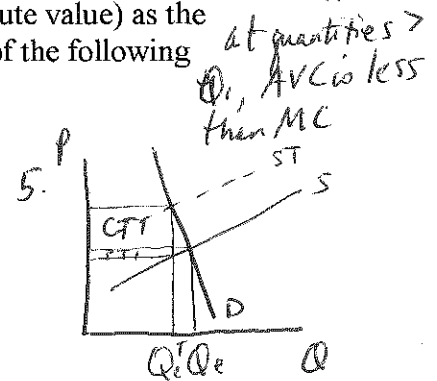
3. Budget Line:
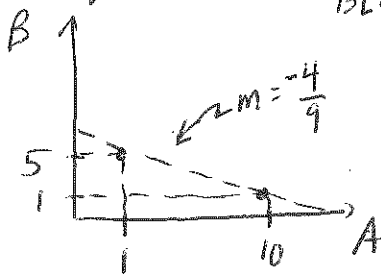
$BL: B = \frac{-4}{9}A + b$

$1 = (-\frac{4}{9})(10) + b$

Such hard #'s: STOP! Time to think! ⇒ I can buy a lot more A than B ⇒ price of A is much lower than price of B. If I am willing to substitute A for B, I should use all my income to buy good A!

Here's the image:

Highest IC I can reach ⇒ buy all A, zero units of B

6) Suppose the government knows that in both the markets for mustard and ketchup the supply curve is given by the following equation where P is the price per unit and Q is the quantity of units of the good:

$$P = Q$$

but they don't know the demand curves for each market. The government then implements an excise tax of $1 in both markets and observes that the deadweight loss is greater in the market for mustard. Given this information and holding everything else constant, which of the following statements is true?

a) The demand curve for mustard is steeper than the demand curve for ketchup.
(b) The demand curve for ketchup is steeper than the demand curve for mustard.

NOT HARD

7) When a small economy opens its milk market to international trade, which of following can **never** happen?

(a) Consumer and producer surplus in this domestic market both increase.
b) Producer surplus in this domestic market increases, and consumer surplus in this domestic market decreases.

6.

7.
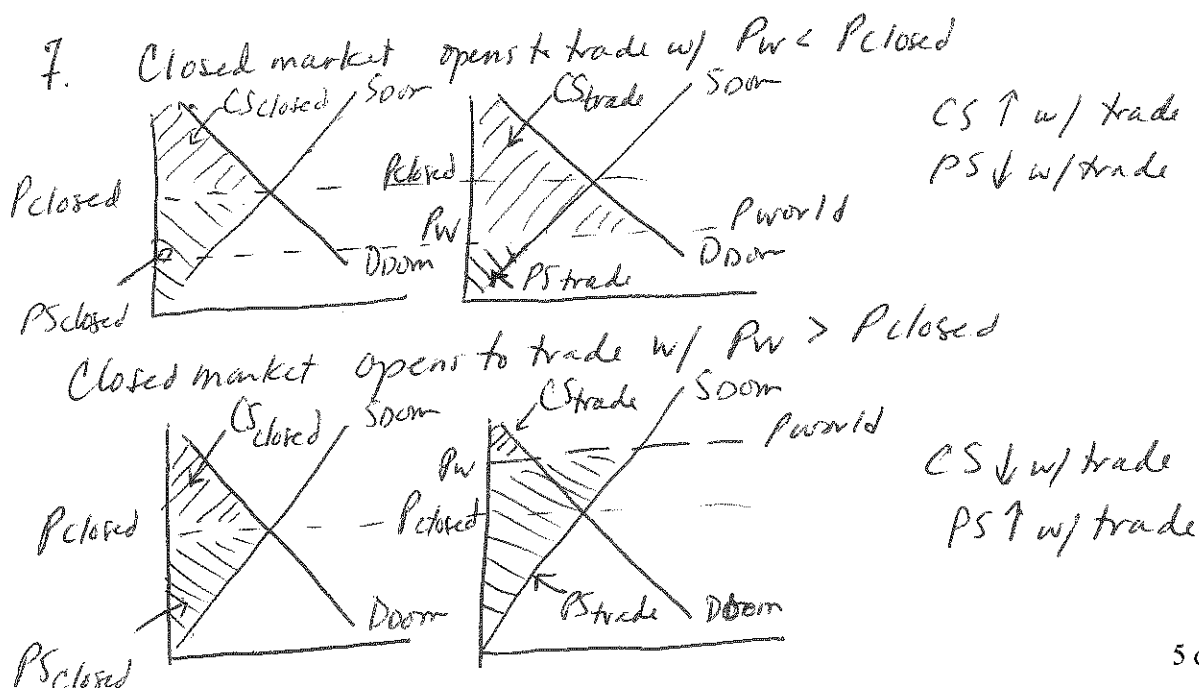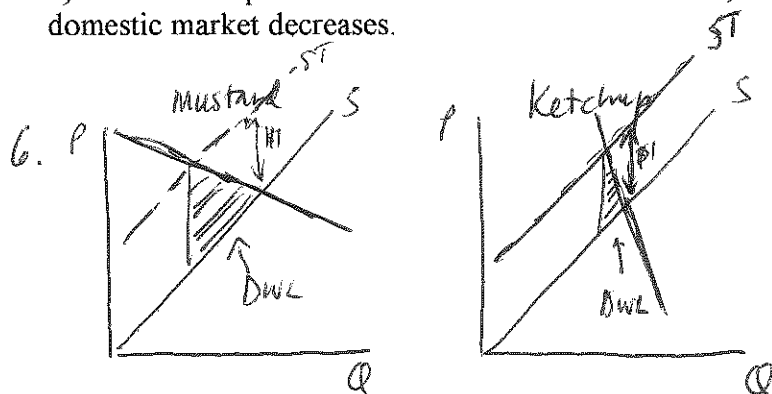
8) Suppose the demand for ice cream at Memorial Union is given by the following equation where Q is the quantity in units of ice cream and P is the price per unit of ice cream:

$$Q = 30 - 3P$$

Given this information and holding everything else constant, the *revenue* maximizing price of ice cream must be:

(a) $5.
b) $15.

CAREFUL HERE - LOOKING FOR THE BUNDLE THAT CANNOT BE OPTIMAL→ A BIT CHALLENGING

9) Suppose George only consumes Apples and Bananas, and George's preferences over these two goods can be represented by standard bowl-shaped indifference curves. Initially, the price of Apples is $1, and the price of Bananas is $2 and George's available budget to spend on Apples and Bananas is $10. Given these prices and his budget, George optimally purchases 2 Apples and 4 Bananas. Now suppose the price of Apples increases to $2 and at the same time the price of Bananas falls to $1 (George's budget for these two goods does not change). Which of the following bundles **cannot** be optimal after this change? (Hint: draw the two budget lines and the indifference curve tangent to the original optimal bundle.)

(a) 4 Apples and 2 Bananas
b) 2 Apples and 6 Bananas

8. $Q = 30 - 3P$

$3P = 30 - Q$

$P = 10 - \frac{1}{3}Q$
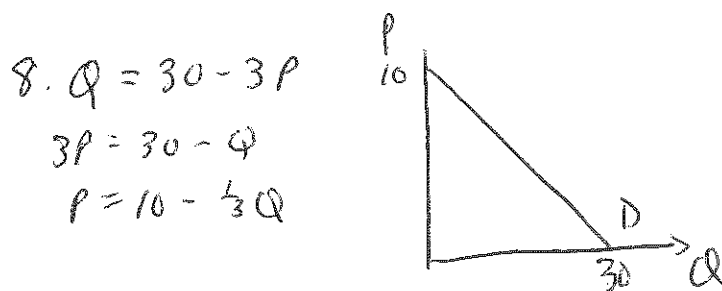
Revenue Maximized at midpoint of a linear D curve => $P = \$5$

9. BL_1 : $P_A = \$1$
$P_B = \$2$
$Inc = \$10$
Chooses 2A, 4B

BL_2 : $P_A' = \$2$
$P_B' = \$1$
$Inc = \$10$

Can he afford 4A, 2B with BL_2?
$4(2) + 2(1) = 10 =>$ Yes
Can he afford 2A, 6B with BL_2?
$2(2) + 6(1) = 10 =>$ Yes
} Both points on BL_2
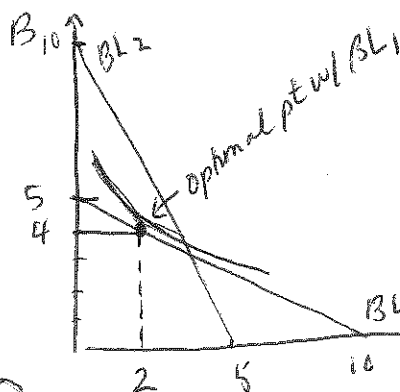
Optimal bundle on BL_2 must be on "steeper" portion of IC => a point with less A than 2A & more bananas than 4B =>
Option (a) CANNOT be optimal

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EXAM CONTINUES ON NEXT PAGE

Multiple Choice (20 questions worth 4 points each)

Use the following information for the next two (2) questions:

Nokia is a small, closed economy that produces only cellphones. The domestic demand and domestic supply curves for cellphones in Nokia is given by the following equations, where P is the price per unit and Q is the quantity of cellphones:

Domestic Demand: $P = 200 - (1/20) Q$
Domestic Supply: $P = 20 + (1/20) Q$

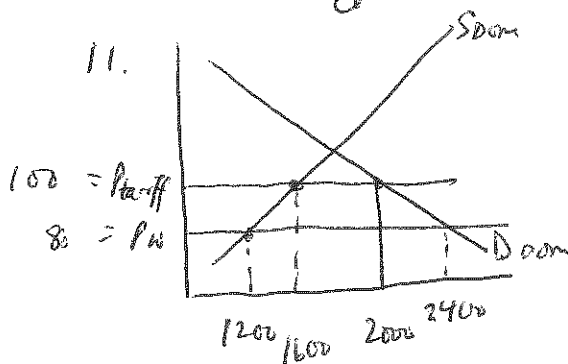The world price is $80 per cellphone.

PREDICTABLE
not hard
10) Given the above information, if Nokia opens its cellphone market to international trade, how many cellphones will it import?

a) Imports = 600 cellphones
b) Imports = 900 cellphones
c) Imports = 1200 cellphones
d) Imports = 1800 cellphones

EASY -
PREDICTABLE
11) Suppose Nokia opens its cellphone market to international trade while simultaneously the government of Nokia implements a tariff of $20 per cellphone imported. Given this information and holding everything else constant, what is the amount of tariff revenue the government will earn from the imposition of this tariff?

a) $4,000
b) $8,000
c) $12,000
d) $24,000

10. If $P_w = 80$

$\Rightarrow$ Demand: $80 = 200 - (\frac{1}{20})Q^D$

$\frac{1}{20}Q^D = 120$

$Q^D = 2400$

$\Rightarrow$ Supply: $80 = 20 + \frac{1}{20}Q^S$

$60 = \frac{1}{20}Q^S$

$Q^S = 1200$

$Q^D - Q^S = $ # of imports

$2400 - 1200 = 1200$

11.

$P_{tariff} \Rightarrow 100 = 200 - \frac{1}{20}Q^D_{tariff}$

$\frac{1}{20}Q^D_{tariff} = 100$

$Q^D_{tariff} = 2000$

$100 = 20 + \frac{1}{20}Q^S_{tariff}$

$80 = \frac{1}{20}Q^S_{tariff}$

$Q^S_{tariff} = 1600$

Tariff Rev = $(2000 - 1600)(20)$

Tariff Rev = $(400)(20)$

Tariff Rev = 8000

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EXAM CONTINUES ON NEXT PAGE

Use the following information for the next two (2) questions:

Consider the following table of nominal share prices for Apple, Samsung, and LG.
Assume that 2010 is the base year and that the CPI is measured on a 100-point scale.

	CPI	Nominal Apple Share Price	Nominal Samsung Share Price	Nominal LG Share Price
2010	100	$100	$80	y
2018	150	$180	x	$120

SOME WORK REQUIRED!

12) Suppose LG's **real** share price increased by 100% between 2010 and 2018. Given this information, what was the **nominal** price of LG shares in 2010?

a) $20
b) $40 *(circled)*
c) $60
d) $80

LOTS OF STEPS – SOME THOUGHT REQUIRED

13) Suppose Apple's **real** share price was 20% higher than the Samsung's real share price. What must be the **nominal** price of Samsung shares in 2018?

a) $100
b) $125
c) $150 *(circled)*
d) $200

Year	CPI	Nom Apple	Real Apple	Nom Samsung	Real Samsung	Nom LG	Real LG
2010	100	100	100	80	80	③ y = 40	② z = 40
2018	150	180	④ 120	⑥ x = 150	⑤ a = 100	120	① 80

12.

① Real $LG_{2018} = \frac{120}{150}(100) = \frac{4}{5}(100) = 80$

② % Δ in real LG share price = 100% = $\left[\frac{\text{new value} - \text{initial value}}{\text{initial value}}\right](100\%)$

$100\% = \left[\frac{80-z}{z}\right]100\% \Rightarrow z = 80 - z$
$2z = 80$
$z = 40$

③ In base year, nom value = real value ⇒ since real value = 40, ∴ nom value = 40

13. ④ real $Apple_{2018} = \frac{180}{150}(100)$

real $Apple_{2018} = \frac{6}{5}(100) = 120$

⑤ 1.20% a = 120
   a = 100

⑥ $100 = \frac{x}{150}(100)$
   $150 = x$

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EXAM CONTINUES ON NEXT PAGE

Use the following information for the next two (2) questions:

Suppose Ingrid only consumes restaurant meals (R) and vacations (V) and her (standard bowl-shaped) preferences are described by the following equations:

$$U = RV$$
$$MU_R = V$$
$$MU_V = R$$

(Hint: The optimality condition for these preferences implies Ingrid will always spend half of her income on each good. i.e., $P_V V = 0.5I = P_R R$)

Suppose her income is $200, the price of restaurant meals is $5, and the price of vacations is $20.

NoT TRU
BAD

14) Given this information and holding everything else constant, which of the following statements is **true**?

a) Ingrid will consume the same amount of restaurant meals and vacations at the given price and income levels. *No ⇒ if she spends $100 on meals ⇒ she eats 20 meals; $100 on vacations ⇒ she consumes 5 vacations*
b) If Ingrid's income doubles, her consumption of both goods will double. *TRUE*
c) Restaurant meals are an inferior good for Ingrid at the given prices. *NoT TRUE*
d) Ingrid will consume more vacations than restaurant meals at the given prices and income. *NoT TRUE*

A LoT oF WORK –
PREDICTABLE
HOWEVER!

15) Suppose the price of restaurant meals increases to $20. Given this information and holding everything else constant, which of the following correctly describe the income and substitution effects on Ingrid's consumption of restaurant meals?

a) Ingrid reduces her total consumption of restaurant meals by 15 meals. ✓ Of this reduction, the substitution effect accounts for a reduction of 10 meals, ✓ and the income effect accounts for the remaining reduction of 5 meals. ✓
b) Ingrid reduces her total consumption of restaurant meals by 10 meals. ✗ Of this reduction, the substitution effect accounts for a reduction of 5 meals, and the income effect accounts for the remaining 5 meals.
c) Ingrid reduces her total consumption of restaurant meals by 15 meals. Of this reduction, the substitution effect accounts for a reduction of 5 meals, ✗ and the income effect accounts for the remaining 10 meals. ✗
d) Ingrid reduces her total consumption of restaurant meals by 10 meals. ✗ Of this reduction, the substitution effect accounts for a reduction of 8 meals, and the income effect accounts for the remaining 2 meals.

14. (a) Not true
(b) $200 in income ⇒ 20 meals, 5 vacations   } TRUE
   $400 in income ⇒ 40 meals, 10 vacations
(c) Not true ⇒ As her income ↑, She consumes more of both goods
(d) Not true ⇒ She consumes more meals & fewer vacations

15. BL_1: $P_{\text{restaurant meals}} = \$5$

$P_{\text{vacation}} = \$20$

$Income = \$200$

$200 = 5M + 20V$

$\boxed{40 = R + 4V}$

$\dfrac{MU_R}{P_R} = \dfrac{MU_V}{P_V}$

$\dfrac{V}{5} = \dfrac{R}{20}$

$20V = 5R$

$\boxed{4V = R}$

$40 = R + R$

$40 = 2R$

$20 = R$

BL_2: $P_{\text{restaurant meals}} = \$20$

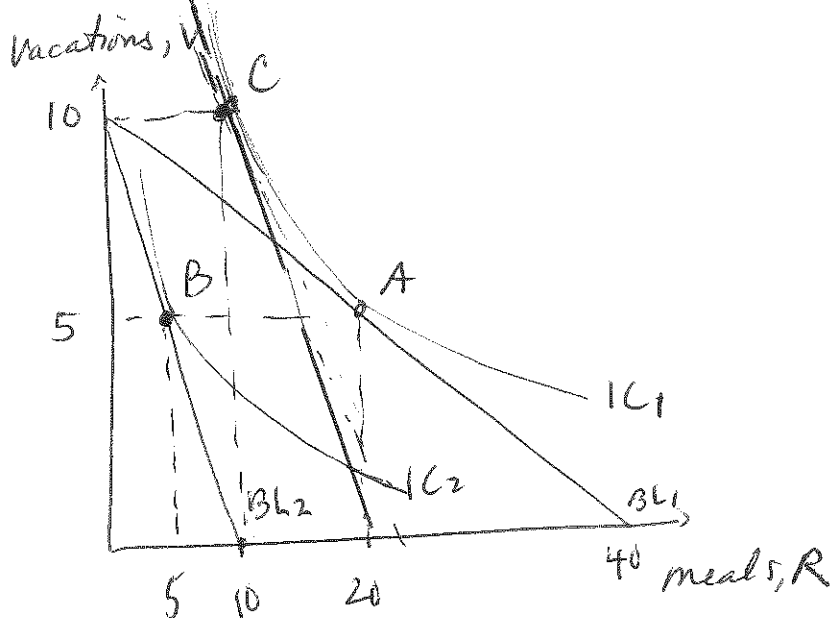$P_{\text{vacations}} = \$20$

$Income = \$200$

$200 = 20R + 20V$

$10 = R + V$

$\dfrac{V}{20} = \dfrac{R}{20}$

$\boxed{V = R}$

$10 = 2V$

$5 = V, \therefore R = 5$

BL_3: $P_{\text{restaurant meals}} = \$20$

$P_{\text{vacations}} = \$20$

$Income' = unknown$

$\dfrac{V}{20} = \dfrac{R}{20} \Rightarrow \therefore \boxed{V = R}$

Utility at $A = 20(5) = 100$

Utility at $C = $ Utility at $A = 100$

$100 = VR = R^2$ since $V = R$

$R = 10, \therefore V = 10$

A to C $\Rightarrow$ Substitution effect: $R \downarrow$ by 10 meals

C to B $\Rightarrow$ income effect: $R \downarrow$ by 5 meals

A to B $\Rightarrow \downarrow$ in R by 15 meals $\Rightarrow$ eliminates answers (b) and (d)

16) The inflation rate in Madison from 2015 to 2016 was -20%. Further, the inflation rate from 2016 to 2017 was 25%. Suppose the nominal price of an apple was $5 in all three years. Using 2016 as the base year, which of following gives the correct real price for apples over this time period?

a) The real price of an apple was $6 in 2015, $5 in 2016, and $6.25 in 2017.
b) The real price of an apple was $6 in 2015, $5 in 2016, and $4 in 2017.
c) The real price of an apple was $4 in 2015, $5 in 2016, and $4 in 2017.
d) The real price of an apple was $6.25 in 2015, $5 in 2016, and $4 in 2017.

CHALLENGING 17) Consider an economy with two types of workers: high-skilled workers and low-skilled workers. Suppose the wage for high-skilled workers is higher than that for low-skilled workers. The income elasticity of demand for coffee is the same across the two types of workers. Currently, both types of workers consume the same quantity of coffee. Suppose the wages for both types of workers have gone up by $10 and both types of workers reduce their consumption of coffee. Which of the following statements is **true**?

a) Coffee is a normal good. Low-skilled workers will consume more coffee than high-skilled workers after the income change.
b) Coffee is an inferior good. Low-skilled workers will consume more coffee than high-skilled workers after the income change.
c) Coffee is an inferior good. Low-skilled workers will consume less coffee than high-skilled workers after the income change.
d) Coffee is an inferior good. Both types of workers will consume the same amount of coffee after the income change.

16.

Year	Nom price	Inflation Rate	$CPI_{BY=2015}$	$CPI_{BY=2016}$	Real price BY=2016
2015	$5	$\downarrow$ -20%	100	$\frac{100}{80}(100) = 125$	$\frac{5}{125}(100) = 4$
2016	$5	$\uparrow$ 25%	80	$\frac{80}{80}(100) = 100$	$\frac{5}{100}(100) = 5$
2017	$5		100	$\frac{100}{80}(100) = 125$	$\frac{5}{125}(100) = 4$

17. $G_I = \dfrac{\% \Delta Q^D_{coffee}}{\% \Delta Income}$

High-skilled workers — Smaller % Δ in Income

Low-skilled workers — larger % Δ in Income

$10 ↑ income

∴ Smaller % ΔQ^D_{coffee} Larger % ΔQ^D_{coffee}

As income ↑, consumption ↓ coffee ↓ for both groups ⟹ ∴ coffee is an inferior good
⟹ eliminates answer (a)

18) Suppose the cross-price elasticity of demand for traditional workers and the price of robots is equal to 1 and the cross-price elasticity of demand for robots and the price of traditional workers is equal to 2. Given this information and holding everything else constant, which of the following statements are **true?**

I) Traditional workers and robots are substitutes for one another. *TRUE*
II) If the price of traditional workers falls from $50 to $40, the demand for robots will decrease by 20%. *FALSE*
III) If the price of robots falls from $1000 to $900, the demand for traditional workers will decrease by 10%. *TRUE*

a) Only statement I is true.
b) Only statements I and III are true.
c) Only statements II and III are true.
d) All three statements are true.

(b is circled)

19) Suppose you are looking to estimate the price elasticity of demand for a market, but you don't know the demand curve. Initially, you observe an equilibrium price of $6 and an equilibrium quantity of 8 units. However, after a major producer shuts down due to a major factory fire, you observe a new equilibrium price of $8 and an equilibrium quantity of 4 units. Using the **midpoint** formula for the price elasticity of demand, find an approximation for the price elasticity of demand.
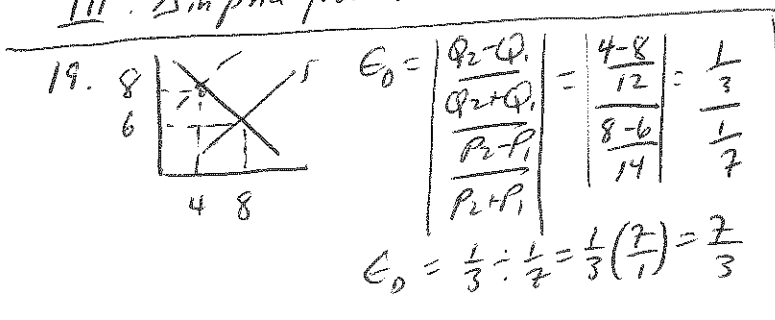
a) 1/6
b) 6
c) 3/7
d) 7/3

(d is circled)

18. $E_{\text{traditional workers price of robots}} = \dfrac{\% \Delta Q^D \text{traditional workers}}{\% \Delta \text{Price of robots}} = 1$

$E_{\text{robots price of traditional workers}} = \dfrac{\% \Delta Q^D \text{robots}}{\% \Delta \text{Price of Traditional Workers}} = 2$

I. As price of robots ↑, Q^D traditional workers ↑ ⇒ they are substitutes } I is TRUE
As price of traditional workers ↑, Q^D robots ↑ ⇒ they are substitutes✓

II. Δ in price from 50 to 40 is 20% ↓ ⇒ $\dfrac{\% \Delta Q^D \text{robots}}{-20\%} = 2$
∴ $\% \Delta Q^D \text{robots} = -40\%$ } II is FALSE

III. Δ in price from 1000 to 900 is 10% ↓ ⇒ $\dfrac{\% \Delta Q^D \text{traditional workers}}{-10\%} = 1$
∴ $\% \Delta Q^D \text{traditional workers} = ↓ 10\%$
III is TRUE

19.

$E_0 = \left| \dfrac{Q_2 - Q_1}{\frac{Q_2 + Q_1}{2}} \middle/ \dfrac{P_2 - P_1}{\frac{P_2 + P_1}{2}} \right| = \left| \dfrac{\frac{4-8}{12}}{\frac{8-6}{14}} \right| = \dfrac{\frac{1}{3}}{\frac{1}{7}}$

$E_0 = \dfrac{1}{3} \div \dfrac{1}{7} = \dfrac{1}{3}\left(\dfrac{7}{1}\right) = \dfrac{7}{3}$

Use the following information for the next two (2) questions:

Consider the market for earplugs in a small economy that can be described by the following equations, where P is the price per pair of earplugs and Q is the quantity of pairs of earplugs:

Domestic Demand Curve for earplugs: $Q = 170 - 10P$
Domestic Supply Curve for earplugs: $Q = 20P - 10$

Furthermore, you know this market is open to international trade and the world price of earplugs is $3 per pair.

SOME WORK: NOT HARD!

20) The government decides to impose an import quota of 30 pairs of earplugs. What is the deadweight loss (DWL) due to the imposition of this import quota?

a) DWL = $40
b) DWL = $60 *(circled)*
c) DWL = $80
d) DWL = $120

21) Suppose the government considers implementing a policy that changes the import quota to 100 pairs of earplugs. Holding everything else constant, which of the following statements would be **true** if the government implemented this new import quota?

a) The economy would import 100 pairs of earplugs with this policy. *NOT TRUE*
b) The domestic price of earplugs would be $4 with this policy. *NOT TRUE*
c) The government could replace this import quota with a tariff to make the imports equal to 100 earplugs. *Not True.*
d) There would be no deadweight loss if the government implemented this policy. *TRUE* *(circled)*

Handwritten work:

$20, P$ S_{Dom}
$P_{quota} = 5$ 30
$3 = P_W$ D_{om}
$50 \ 90 \quad 120 \ 140 \quad Q$
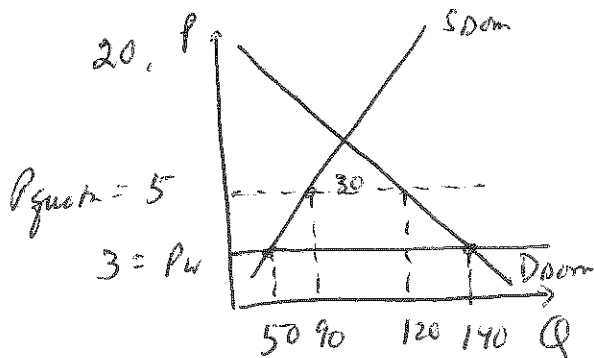
if $P_W = 3 \Rightarrow Q^D = 170 - 10(3)$
$= 140$
$\Rightarrow Q^S = 20(3) - 10$
$= 50$

w/ import quota:
$Q^S + 30 = Q^D$
$20P - 10 + 30 = 170 - 10P$
$30P = 150$
$P = 5$

if $P_{quota} = 5 \Rightarrow Q^D = 170 - 10(5) = 120$
$Q^S = 20(5) - 10 = 90$

$DWL_{quota} = \frac{1}{2}(5-3)(90-50) + \frac{1}{2}(5-3)(140-120)$
$= 40 + 20 = \$60$

21. At $P_W \Rightarrow$ imports = 90
90 is maximum amt of imports we would see in this market!
So (a) is not true.
Price would be P_W or $3 with this policy $\Rightarrow$
So (b) isn't true.
This economy will not import 100 units w/a tariff or an import quota $\Rightarrow$ (c) is not true.
This policy is no that results in the free economy outcome $\Rightarrow$ ∴ no DWL!

Answer: C

16 of 26

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EXAM CONTINUES ON NEXT PAGE

Use the following information for the next two (2) questions:

Suppose Alice only consumes 2 goods, good X and good Y. Suppose she has an income of $100 that she allocates between these two goods. The following graph represents Alice's consumer optimization following an increase in the price of good X (moving from BL1 to BL2). The points labeled A, B, and C represent tangencies between Alice's indifference curves and her budget lines.

Point A: X = 5, Y = 5
Point B: X = 0.5, Y = 9
Point C: X = 3, Y = 8

Handwritten annotations on graph:
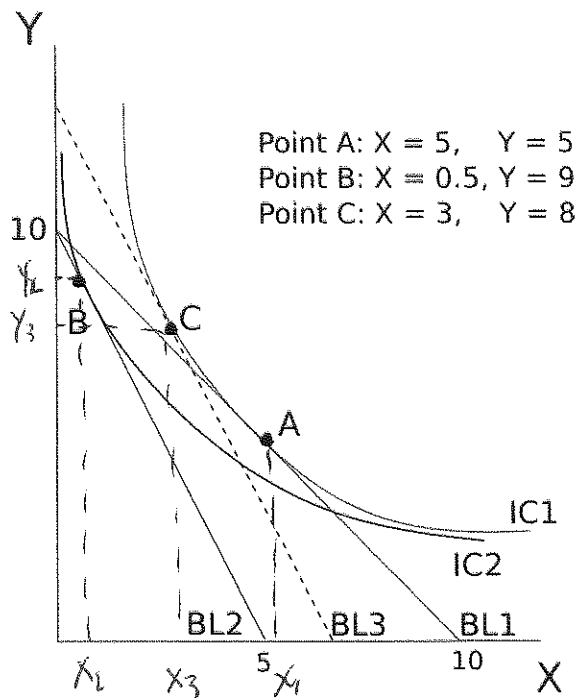
22. as income ↑ =>
compare BL_2 to BL_3
$Y_2 ↓$ to Y_3 => Y is inferior
$X_2 ↑$ to X_3 => X is normal
(a) is not true => FALSE!!

(left margin) SOME THOUGHT

22) Given the information above and holding everything else constant, which of the following statements are **false?** → Looking for FALSE!

(a) Both good X and good Y are normal goods. FALSE
b) The substitution effect from the increase in the price of good X results in a decrease in the consumption of good X. True => X_1 to X_3
c) Alice prefers point C over point B. True => IC, is further away from origin than IC2
d) After the price increase in good X, the price of good X is double the price of good Y. True => with same income she can afford 10 units of Y or 5 units of X

(left margin) SOME WORK!

23) Suppose, after the increase in the price of good X, you wanted to compensate Alice just enough so that she could just afford her original level of utility. How much money would you have to give Alice to achieve this goal?

a) $5
b) $20
(c) $40
d) $50

Handwritten work:

BL_1: Income = 100 } Can get P_x & P_y from graph => with $100
P_x = $10 } She can afford 10 units of Y or 10 units of X
P_y = $10

BL_2: Income = 100
P_x' = $20
P_y = $10

How much does Bundle C cost?
3 units of X => 3(20) = 60
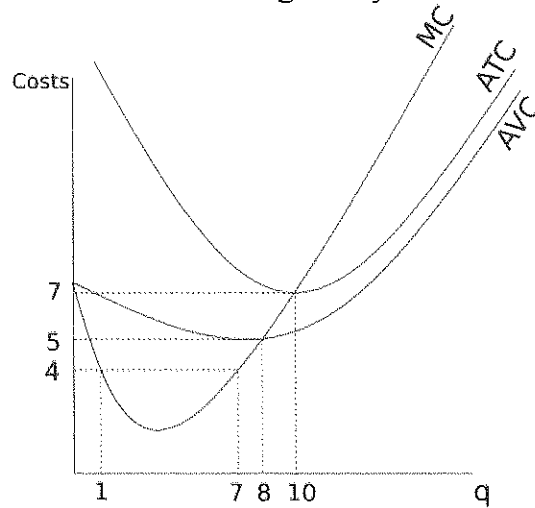8 units of Y => 8(10) = 80
Income = 140 ? $40
for C

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24) Suppose a firm faces a schedule of costs given by the following graph:

Given this graph and holding everything else constant, how many of the following statements are true?

- When this firm produces ten units of the good, its total cost is $70. *TRUE*
- When this firm produces ten units of the good and sells its product for $7 per unit, then this firm's Total Revenue is equal to its Total Cost. *TRUE*
- Since the vertical distance between the ATC and AVC curves narrows as the level of output increases this implies that Fixed Cost decreases as the level of production expands. *FALSE*
- Given the Marginal Cost of producing one more unit of the good, we can conclude that the ATC is decreasing as output increases while the AVC is increasing as output increases. *FALSE*

a) One statement is true.
b) Two statements are true.
c) Three statements are true.
d) Four statements are true.

- If $Q = 10 \Rightarrow ATC = 7 \Rightarrow ATC = \frac{TC}{Q} \Rightarrow TC = ATC \cdot Q = 7(10) = 70$
- $TR = P \cdot Q = 7(10) = 70$
  $TC = 70$
- $ATC \downarrow$ as the level of production $\uparrow$, but FC is constant
- $ATC \downarrow$ as output $\uparrow$ until we reach 10 units, then $ATC \uparrow$ as output $\uparrow$
  $AVC \downarrow$ as output $\uparrow$ until we reach 8 units, then $AVC \uparrow$ as output $\uparrow$

EASY

25) Suppose the US Post Office is trying to set the price of stamps to maximize revenue. Suppose the demand for stamps is given by the following equation where P is the price per stamp and Q is the quantity of stamps:

$$P = 2 - 0.001Q$$

The US Post Office knows that, at the current price, the demand for stamps is elastic. Given this information, which of the following statements must be **false**? → *Looking for FALSE!*

a) Raising the price per stamp would increase total revenue for the US Post Office. *FALSE*
b) The current price of a stamp must be above $1. *TRUE*
c) The current quantity of stamps being sold must be lower than 1000 stamps. *TRUE*
d) The price elasticity of demand at the current price is greater than 1. *TRUE*
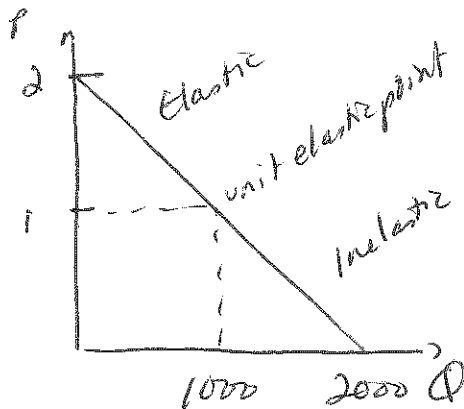
If $P = 0 \Rightarrow$ $2 = .001Q$
$Q = 2000$

$$.001\overline{)2,000}$$

Use the following information for the next <u>two (2)</u> questions:

The following table expresses the output quantity a factory can produce given the number of workers hired and the number of units of capital used.

(handwritten column headers added to the right: Fixed Costs | Variable Cost)

Quantity produced	Number of workers used	Units of capital used	Fixed Costs	Variable Cost
0	0	10	2000	0
1	1	10	2000	100
2	3	10	2000	300
3	7	10	2000	700
4	12	10	2000	1200

Suppose each worker is paid $100, and each unit of capital costs $200. The firm can adjust the number of workers it hires, but it cannot immediately adjust the amount of capital it uses.

(handwritten left margin: NOT HARD)

26) What is the marginal cost to the firm of producing the 3rd unit?

a) $200
b) $400 *(circled)*
c) $700
d) $2700

(handwritten work:)

$$MC = \frac{\Delta TC}{\Delta Q}$$

TC for 2 units = 2000 + 300 = 2300
TC for 3 units = 2000 + 700 = 2700

$$MC = \Delta TC/\Delta Q = \frac{2700 - 2300}{3 - 2} = 400$$

(handwritten left margin: NOT TOO BAD)

27) Given the above information and holding everything else constant, what is the average total cost to this firm of producing 4 units of output?

a) $300
b) $800 *(circled)*
c) $2000
d) $4000

(handwritten work:)

TC of producing 4 units of output = 3200

ATC of producing 4 units of output = $\frac{TC}{Q}$

$$ATC = \frac{3200}{4} = 800 \Rightarrow \boxed{ANSWER: B}$$

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Use the following information for the next two (2) questions:

Consider the market for Picasso paintings. Since Picasso has been dead for some time, the supply of his paintings is perfectly inelastic. The supply curve for his paintings is given by the following equation where Q is the quantity of paintings:

Supply Curve for Picasso Paintings: Q = 1000

Suppose the demand for Picasso paintings is given by the following equation where P is the price per painting:

Demand Curve for Picasso Paintings: P = 12000 − 5Q

THIS IS A MORE CHALLENGING QUESTION

28) Suppose the government decides to implement an excise tax of $1000 per painting on this market. What will be government tax revenue, consumer tax incidence, and producer tax incidence when this policy is implemented in this market?

a) Government Tax Revenue = Consumer Tax Incidence = Producer Tax Incidence = $0. ✗
b) Government Tax Revenue = $1,000,000. Consumer Tax Incidence = Producer Tax Incidence = $500,000. ✗
c) Government Tax Revenue = Consumer Tax Incidence = $1,000,000. Producer Tax Incidence = $0. ✗
d) Government Tax Revenue = Producer Tax Incidence = $1,000,000. Consumer Tax Incidence = $0.

(d is circled)

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Handwritten work:
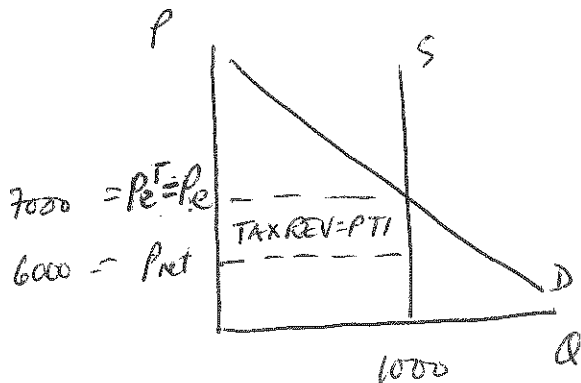
In this market there is only one price where demanders demand 1000 paintings =)
P = 7000!
So if govt imposes an excise tax the suppliers will sell the paintings at
P_e^{tax} = 7000 & keep P_{net} = 6000
Tax Rev = (1000)(1000) = 1,000,000
PTI = Tax Revenue = 1,000,000
CTI = 0

7000 = P_e^{tax} = P_e
6000 = P_{net}

TAX REV = PTI

The following question uses the information from the previous page.
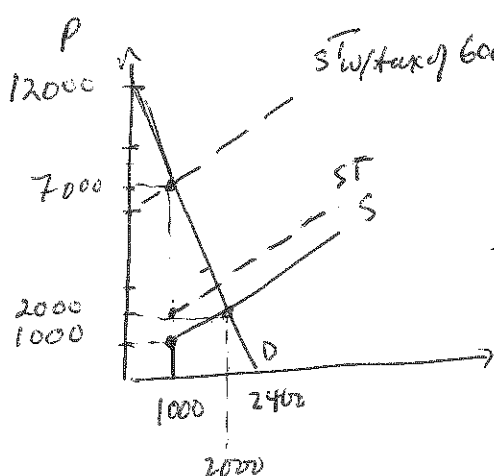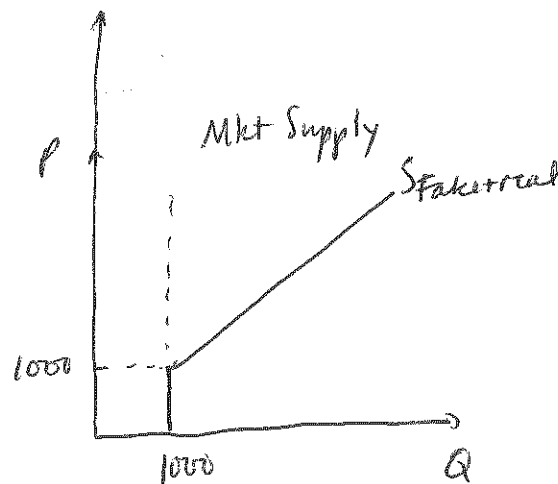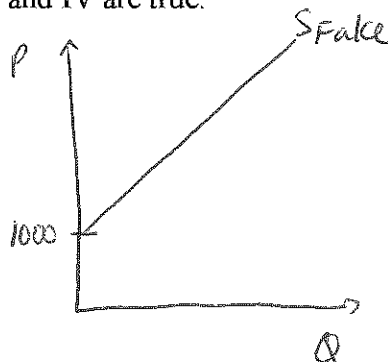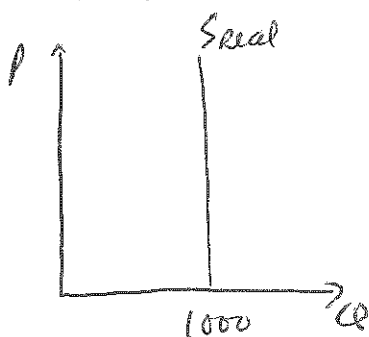
HARD!

29) Suppose counterfeiters realize that producing fake Picasso paintings is very lucrative, so now the supply of paintings is composed of the original Q = 1000 real paintings, plus an amount of fake paintings given by the following equation where Q_{fake} is the quantity of fake paintings and P is the price per painting:

Supply Curve for Fake Picasso Paintings: $Q_{fake} = P - 1000$

(Suppose these fake paintings are of sufficient quality that they are indistinguishable from the real paintings.) Given the above information and holding everything else constant, which of the following statements are **true**?

I) The supply of paintings is now *more* elastic than before provided the price is at least $1000. *TRUE: See image below*
II) If the government imposes the $1000 excise tax as described in the previous question, consumer tax incidence will now be greater after the introduction of counterfeiters into this market. *TRUE*
III) If the government imposes the $1000 excise tax as described in the previous question, producer tax incidence will now be greater after the introduction of counterfeiters into this market. *FALSE*
IV) If the government imposes an excise tax of at least $6000 per painting in this market, there will be no counterfeit paintings sold. *TRUE*

a) Only statements I and II are true.
b) Only statements II and III are true.
c) Only statements I, II and IV are true.
d) Only statements I, III, and IV are true.

S_{Real} P S_{Fake} P Mkt Supply $S_{fake+real}$

1000   1000   1000

1000   Q   Q   1000   Q

S w/ tax of 6000/painting

II. CTI w/out fake paintings ↓ with tax = 0 (last question)
CTI w/ fake paintings ↓ excise tax > 0
TRUE
III. PTI w/ fake paintings < PTI w/out fake paintings
FALSE ⇒ THIS IS MORE CHALLENGING TO SEE!
IV. See Diagram
IV. TRUE

P
12000
7000
ST
S
2000
1000
D
1000 2402
2000

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<u>END OF EXAM</u>