

FINAL EXAMINATION VERSION B

INSTRUCTIONS: This exam is closed-book, closed-notes. Simple calculators are permitted, but graphing calculators, calculators with alphabetical keyboards, cell phones, and wireless devices are NOT permitted. Numerical answers, if rounded, must be correct to at least 3 significant digits. Point values for each question are noted in brackets. Maximum total points are 200.

I. Multiple choice: Please circle the one best answer to each question. [1 pt each, 27 pts total]

- (1) The assumption in economics that people are *rational* implies that people
- maximize their income.
 - use math to make decisions.
 - ignore "soft" concerns like friendships and charity.
 - do the best they can with what they have.
 - make sacrifices today for a better future.

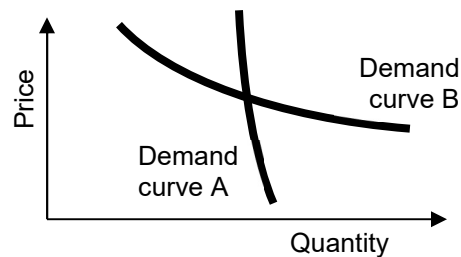
- (2) Aaron buys a ticket to a football game for \$50. When he arrives at the stadium, he discovers that scalpers are willing to pay \$150 for his ticket. His *opportunity cost* of attending the game is now
- \$0.
 - \$50.
 - \$100.
 - \$150.

- (3) Rational choice implies pursuing an activity until the marginal cost of the last unit
- is much greater than its marginal benefit.
 - begins to exceed its marginal benefit.
 - begins to fall below its marginal benefit.
 - is much less than its marginal benefit.

- (4) Some people believe there is excess supply in the housing market. If they are right, then the price of houses can be expected to
- rise.
 - fall.
 - remain constant.
 - Price movements are not related to excess supply.

- (5) In winter, the price of tomatoes increases and the quantity sold decreases. This could be caused by a
- rightward shift in the demand for tomatoes.
 - rightward shift in the supply of tomatoes.
 - leftward shift in the demand for tomatoes.
 - leftward shift in the supply of tomatoes.

- (6) Which demand curve below is *less* elastic?
- Demand curve A.
 - Demand curve B.
 - Both have the same elasticity because they pass through the same point.
 - Cannot be determined from information given.



- (7) It takes time for consumers to adjust their lifestyles to changes in electricity prices. Therefore, the short-run demand for electricity is
- more elastic than the long-run demand.
 - less elastic than the long-run demand.
 - just as elastic as the long-run demand.
 - Elasticity of demand is not related to time for adjustment.

(8) Suppose the price of gold were higher in New York than in Los Angeles, initially. Arbitrage would then *tend to*

- a. raise the price of gold in both cities.
- b. lower the price of gold in both cities.
- c. raise the price of gold in New York and lower the price in Los Angeles.
- d. raise the price of gold in Los Angeles and lower the price in New York.

(9) A quota (or legal maximum quantity) on *selling* ivory would cause its price to

- a. rise.
- b. fall.
- c. rise or fall, depending on the shapes of the demand and supply curves.
- d. remain constant.

(10) Suppose the price elasticity of supply for items sold on the internet in Iowa is 8.0 and the price elasticity of demand is -1.0. If Iowa imposes a tax on internet sales,

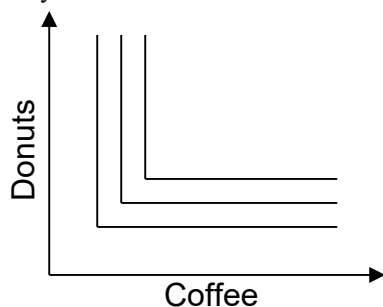
- a. sellers will pay most of the tax.
- b. buyers will pay most of the tax.
- c. sellers and buyers will each pay half of the tax.
- d. Answer depends on which side is legally required to remit the tax to the government.

(11) A change in the quantity of organic vegetables that each person buys is called a change at the

- a. extensive margin.
- b. intensive margin.
- c. marginal product.
- d. marginal revenue.

(12) The indifference-curve graph below shows Beth's preferences. The graph reveals that, for Beth, coffee and donuts are

- a. perfect squares.
- b. perfect substitutes.
- c. perfect complements.
- d. perfectly elastic.



(13) All money paid by a firm for inputs equals by definition the firm's

- a. total cost.
- b. average cost.
- c. marginal cost.
- d. total revenue.
- e. average revenue.
- f. marginal revenue.

(14) The increase in cost caused by the last unit of a firm's output is called the firm's

- a. total revenue.
- b. average revenue.
- c. marginal revenue.
- d. total cost.
- e. average cost.
- f. marginal cost.

(15) *Price equals marginal cost* in a competitive industry in both short-run and long-run equilibrium because

- a. business owners have a sense of fairness.
- b. individual firms adjust their output levels to maximize profit.
- c. consumers refuse to pay more than what is reasonable.
- d. positive profits encourage entry of new firms while negative profits encourage existing firms to leave the industry.
- e. the threat of government regulation causes firms to hold prices down.

(16) If consumers view the products of different firms as *perfect substitutes*, they will

- a. buy some of each.
- b. choose whichever is cheaper.
- c. stay with their current brand, even if it is a little more expensive.
- d. flip a coin to decide which brand to buy.

(17) Suppose the price of a calculator is \$6 and the price of a flashdrive is \$3. If the economy is perfectly competitive, then these prices indicate that the *economy's* opportunity cost of a calculator is

- a. 1/2 of a flashdrive.
- b. 1/3 of a flashdrive.
- c. 1 flashdrive.
- d. 2 flashdrives.
- e. 3 flashdrives.

- (18) A "natural monopoly" is a firm that enjoys
- a downward-sloping average cost curve.
 - patent protection.
 - an exclusive government franchise allowing it alone to sell the product.
 - exclusive ownership of a natural resource essential for producing the product.

(19) Suppose a coffee shop sells 20 cups of specialty coffee if the price is \$3, and sells 21 cups of the same coffee if the price is \$2.95. The shop's marginal revenue of the 21st cup is therefore

- \$0.05 .
- \$1.95 .
- \$2.20 .
- \$2.95 .
- \$3.00 .
- \$20.00 .

(20) Cartels are organizations of firms that try to increase their members' profits by

- boosting output.
- increasing advertising.
- offering discounts and promotional pricing.
- reducing output.
- sharing technology.

(21) Suppose a large city park is spacious and never crowded, so one person using the park does not interfere with others using it. Moreover, the city has no way to charge admission to the park. Therefore the park is

- a nonrival good.
- a nonexcludable good.
- both of the above.
- none of the above.

(22) Newspapers like the *Wall Street Journal* and the *New York Times* offer online versions. Many people can access the online versions without interfering with each other. However, the newspapers can require viewers to pay for access. An online newspaper is therefore

- a nonrival good.
- a nonexcludable good.
- both of the above.
- none of the above.

(23) In some parts of the world, open areas for grazing animals (like sheep or goats) are freely available to anyone. However, these areas are so heavily used that each animal reduces the forage available to other animals. An open grazing area is therefore

- a nonrival good.
- a nonexcludable good.
- both of the above.
- none of the above.

(24) The electric company monitors each customer's usage and bills for it. If a customer does not pay, the customer's electric power is turned off. Now electric power that flows to one customer cannot flow to another customer. Electric power is therefore

- a nonrival good.
- a nonexcludable good.
- both of the above.
- none of the above.

(25) After my neighbor bought and installed outdoor lights, crime decreased at all properties in my neighborhood. My neighbor's outdoor lights created

- an external benefit.
- an external cost.
- a common property resource.
- an inferior good.

(26) It has been suggested that hydraulic fracturing ("fracking"), a technique of drilling for oil or gas, may cause small earthquakes that damage buildings (not owned by the drilling company). If this is true, then hydraulic fracturing creates

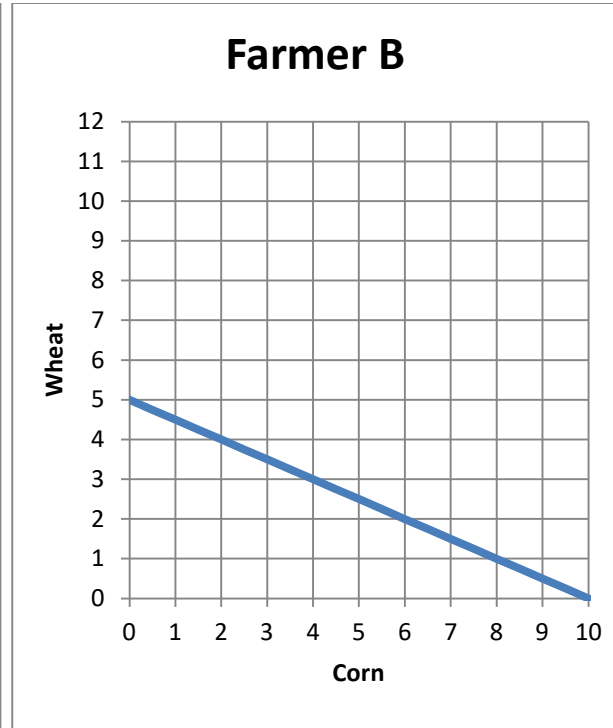
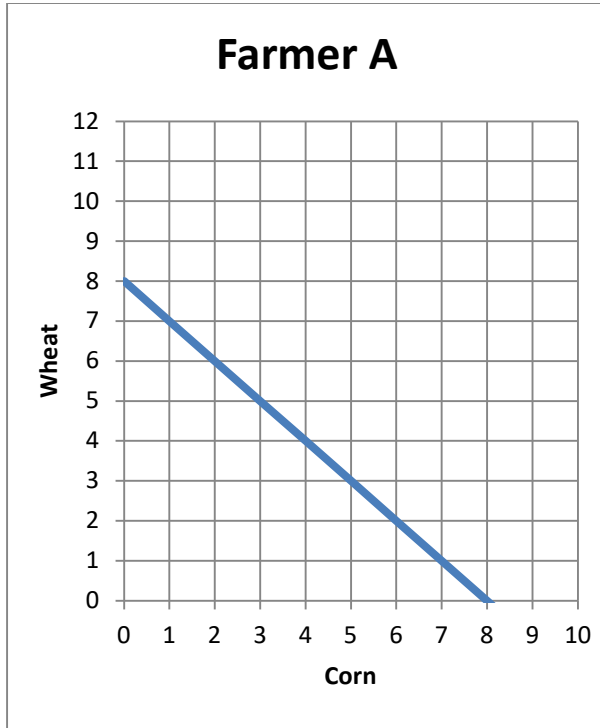
- an external benefit.
- an external cost.
- a necessary good.
- an inferior good.

(27) Unlike other taxes, a pollution tax

- generates no revenue for the government.
- affects only producers.
- causes deadweight loss.
- increases economic efficiency.

II. Problems: Insert your answer to each question in the box provided. Use margins and graphs for scratch work. Only the answers in the boxes will be graded. Work carefully—partial credit is not normally given for questions in this section.

(1) [Comparative advantage, gains from trade: 17 pts] Farmer A and Farmer B can each produce wheat and corn. They each face a tradeoff between these two crops because of limited land. Their production possibility curves are shown below.



- What is Farmer A's opportunity cost of producing a unit of corn?
- What is Farmer B's opportunity cost of producing a unit of corn?
- What is Farmer A's opportunity cost of producing a unit of wheat?
- What is Farmer B's opportunity cost of producing a unit of wheat?
- Which farmer has a comparative advantage in producing corn?
- Which farmer has a comparative advantage in producing wheat?

units of wheat
units of wheat
units of corn
units of corn

g. [3 pts] Fill in the blanks: *Both* farmers can consume combinations of crops *outside* their individual production possibility curves if _____ sends *two* units of wheat to _____, who sends _____ units of corn in return.

h. **Plot** the trade that you propose in part (g) on the graphs above. For each farmer, plot and label the starting point representing **production before trade**, and the ending point representing **consumption after trade**.

(2) [Shifts in demand and supply: 15 pts] Analyze each of the following markets according to the accompanying imaginary scenario.

a. Consider the market for **apple juice**: The price of raw apples (from which juice is made) rises.

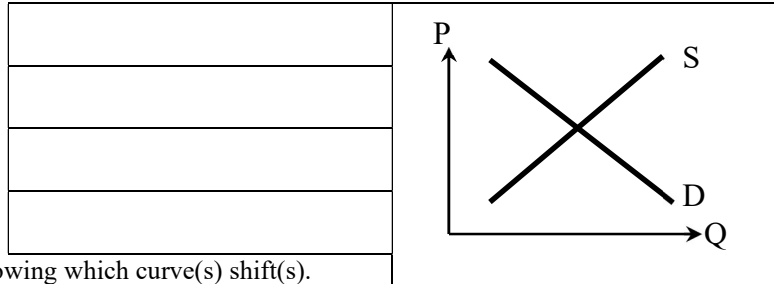
Does demand shift *left*, shift *right*, or remain *unchanged* ?

Does supply shift *left*, shift *right*, or remain *unchanged* ?

Does the equilibrium price *increase*, *decrease*, or *cannot be determined* ?

Does the equilibrium quantity *increase*, *decrease*, or *cannot be determined* ?

Sketch a graph of this scenario at right, showing which curve(s) shift(s).



b. Consider the market for **natural gas**. Suppose we have an unusually cold winter. (Most homes in the Midwest are heated with natural gas.)

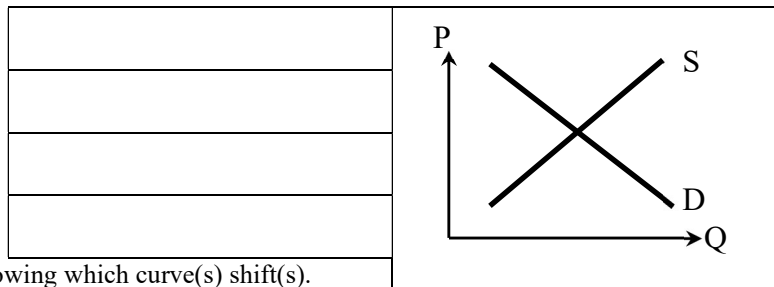
Does demand shift *left*, shift *right*, or remain *unchanged* ?

Does supply shift *left*, shift *right*, or remain *unchanged* ?

Does the equilibrium price *increase*, *decrease*, or *cannot be determined* ?

Does the equilibrium quantity *increase*, *decrease*, or *cannot be determined* ?

Sketch a graph of this scenario at right, showing which curve(s) shift(s).



c. Consider the market for **orange juice**: Suppose consumers begin shifting from fruit juices to water due to high sugar content in fruit juices. Simultaneously, a blight attacks orange trees.

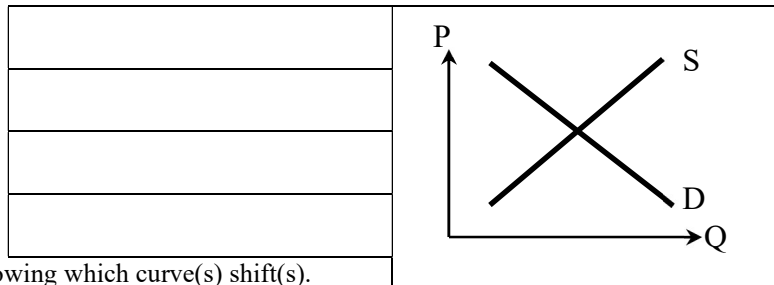
Does demand shift *left*, shift *right*, or remain *unchanged* ?

Does supply shift *left*, shift *right*, or remain *unchanged* ?

Does the equilibrium price *increase*, *decrease*, or *cannot be determined* ?

Does the equilibrium quantity *increase*, *decrease*, or *cannot be determined* ?

Sketch a graph of this scenario at right, showing which curve(s) shift(s).



(3) [Income elasticity of demand: 4 pts] Suppose that when consumers' income rises by 4 percent, the quantity of new cars purchased rises by 6 percent.

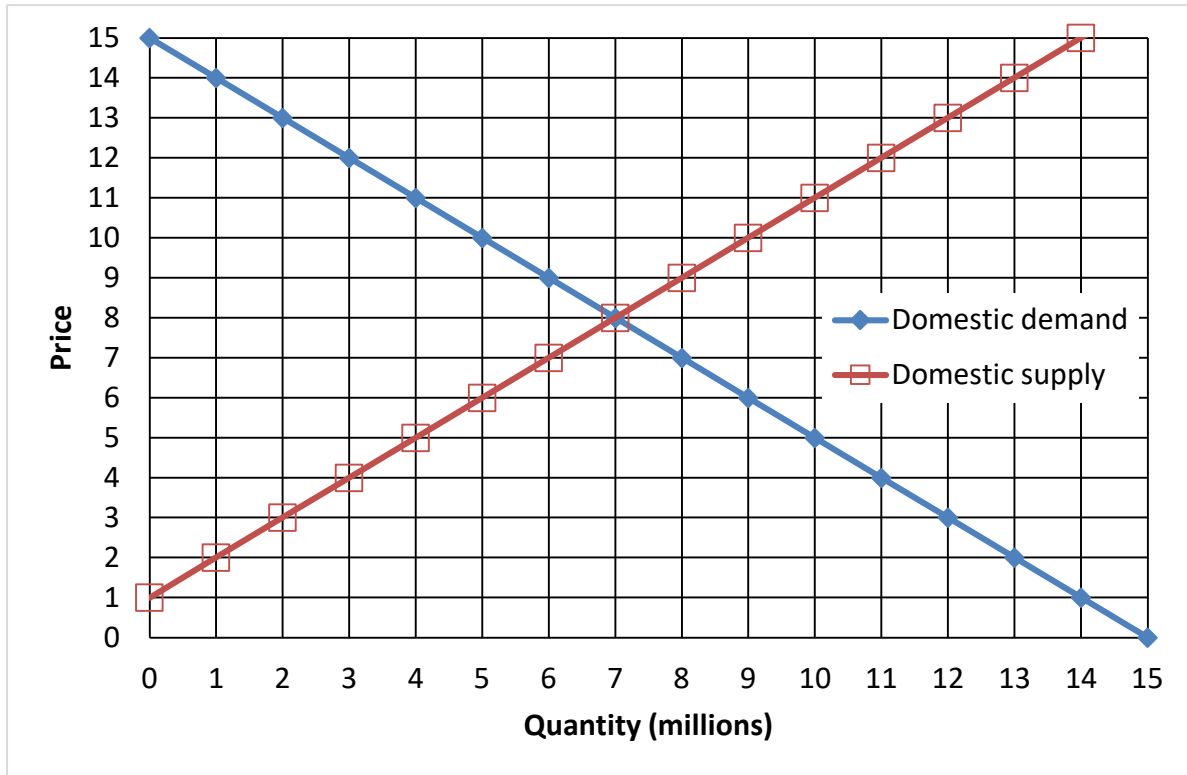
- a. From the information above, are new cars an *inferior good*, a *necessary good*, or a *luxury (or superior) good* ?
- b. Compute the income elasticity of demand for new cars. (Full credit requires correct sign.)

(4) [Using price elasticity of demand: 10 pts] Suppose AMTRAK *raises* train fares by 5%. Suppose the price elasticity of demand for train travel is -1.2. Assume everything else affecting demand for train travel remains constant.

- a. According to the information above, is demand for train travel *elastic*, *inelastic*, or *unitary-elastic*?
- b. As the price rises, will the number of train fares sold *increase*, *decrease*, or remain *constant*?
- c. ... by approximately how much?
- d. Will the total revenue received by AMTRAK *increase*, *decrease*, or remain *constant*?
- e. ... by approximately how much?

%
%

(5) [Welfare analysis of international trade: 18 pts] Domestic supply and demand for TV remote controllers in a particular country are shown in the following graph.



a. At first, international trade in TV remotes is not permitted. Find the equilibrium price without international trade.

\$	
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Then this industry is opened to international trade and the international price of TV remotes turns out to be **\$ 10**.

b. Will this country now *export* or *import* TV remotes?

--

c. How many?

million

d. Does consumer surplus in this country *increase* or *decrease* from international trade in TV remotes?

\$ million

e. By how much?

\$ million

f. Does producer surplus in this country *increase* or *decrease* from international trade in TV remotes?

\$ million

g. By how much?

\$ million

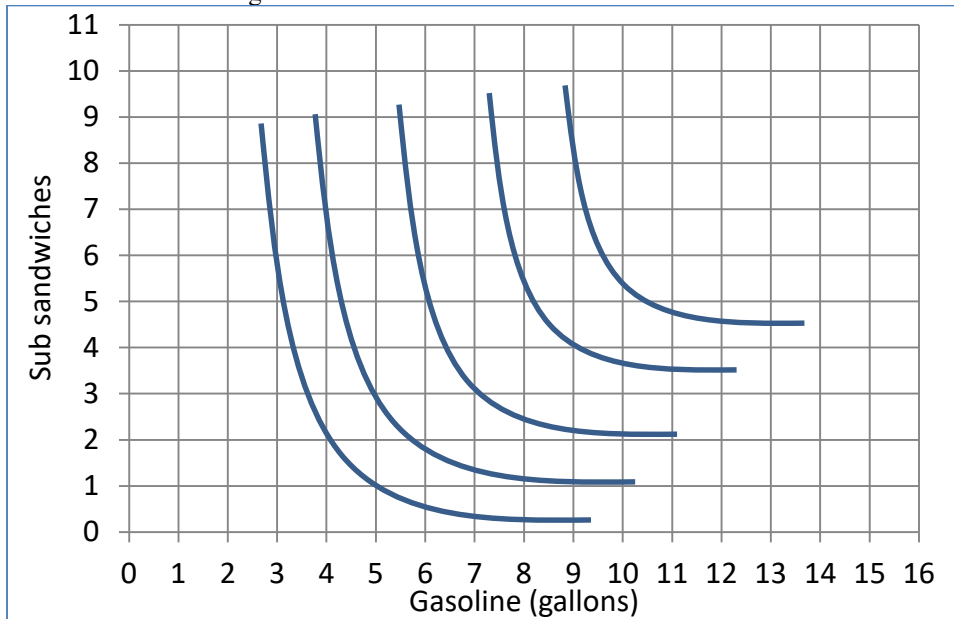
h. Does total social welfare in this country *increase* or *decrease* from international trade in TV remotes?

\$ million

i. By how much?

\$ million

(6) [Consumer choice and demand: 14 pts] The indifference curves in the graph below represent Brittany's preferences for sub sandwiches and gasoline.



- a. Would Brittany rather have 3 sub sandwiches and 5 gallons of gasoline, or 6 sub sandwiches and 3 gallons of gasoline?
- b. Would Brittany rather have 5 sub sandwiches and 6 gallons of gasoline, or 8 sub sandwiches and 4 gallons of gasoline?

sub sandwiches and	gallons of gasoline .
sub sandwiches and	gallons of gasoline .

Suppose Brittany has a budget of \$60 to spend on sub sandwiches and gasoline. The price of sub sandwiches is \$6.

c. **Using a straightedge**, carefully draw Brittany's budget line when the price of gasoline is \$4 per gallon. Label this budget line "A".

d. How much gasoline will Brittany buy if the price of gasoline is \$4?

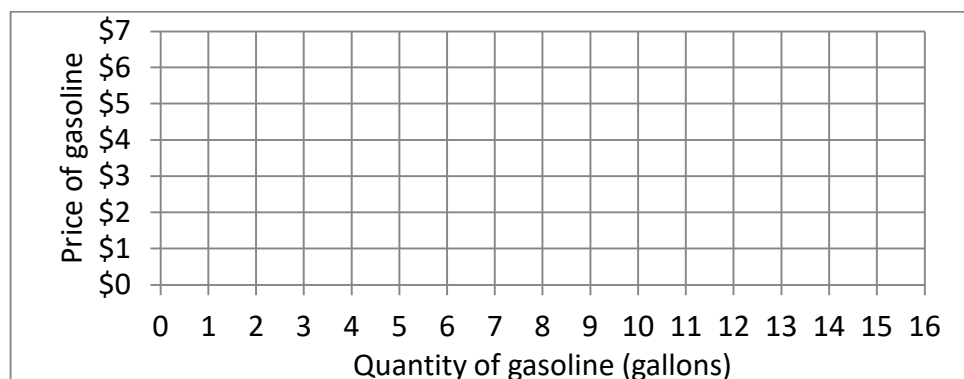
gallons

e. **Using a straightedge**, carefully draw Brittany's budget line when the price of gasoline is \$6 per gallon. Label this budget line "B".

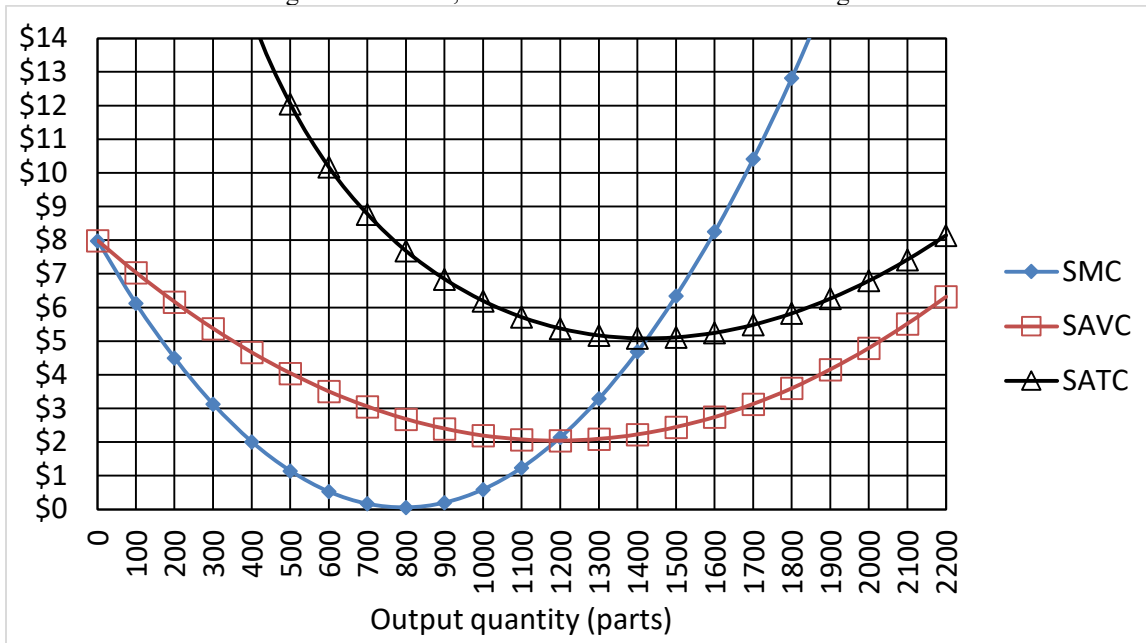
f. How much gasoline will Brittany buy if the price of gasoline is \$6?

gallons

g. Plot two points on Brittany's demand curve for gasoline, and sketch her demand curve at right.



(7) [Short-run cost curves and supply: 20 pts] Micro Manufacturing Company makes a small part used in mobile phones. Micro is a small company in a big market, and therefore takes its output price as given. In the short run, the company faces daily cost curves as shown in the following diagram. Here, SMC denotes short-run marginal cost, SAVC denotes short-run average variable cost, and SATC denotes short-run average total cost.



Suppose the company were currently producing 500 parts for some unknown reason.

a. Compute the company's short-run total cost, to the nearest thousand dollars.

\$	thousand
\$	thousand
\$	thousand

b. Compute the company's short-run variable cost, to the nearest thousand dollars.

c. Compute the company's short-run fixed cost, to the nearest thousand dollars.

d. Suppose the company were currently producing 300 parts for some unknown reason. If the company produced one more part, by how much would its total cost increase? That is, what would be the *change in total cost* as the company increased output from 300 to 301 parts? (Give an answer to the nearest dollar.)

\$

e. What is the company's break-even price—that is, the lowest price at which the company can avoid losses? (Give an answer to the nearest dollar.)

f. What is the company's shut-down price—that is, the lowest price at which it will remain in operation in the short run? (Give an answer to the nearest dollar.)

g. Suppose the price of parts is \$3. How many parts should the company produce? (Give an answer to the nearest hundred.)

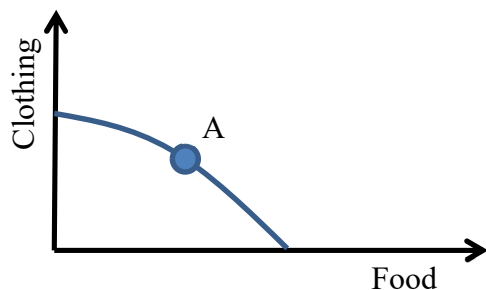
h. Will the company make a *profit* or a *loss* at a price of \$3?

i. Suppose the price of parts is \$8. How many parts should the company produce? (Give an answer to the nearest hundred.)

j. Will the company make a *profit* or a *loss* at a price of \$8?

\$
\$
parts
parts

(8) [Economy-wide efficiency: 16 pts] The graph below shows a country's production possibilities curve. The country is currently at point A, where the slope equals $-1/2$.



Production possibilities curve

- a. What is this **country's** opportunity cost of a unit of food?
- b. What is this **country's** opportunity cost of a unit of clothing?

units of clothing
units of food

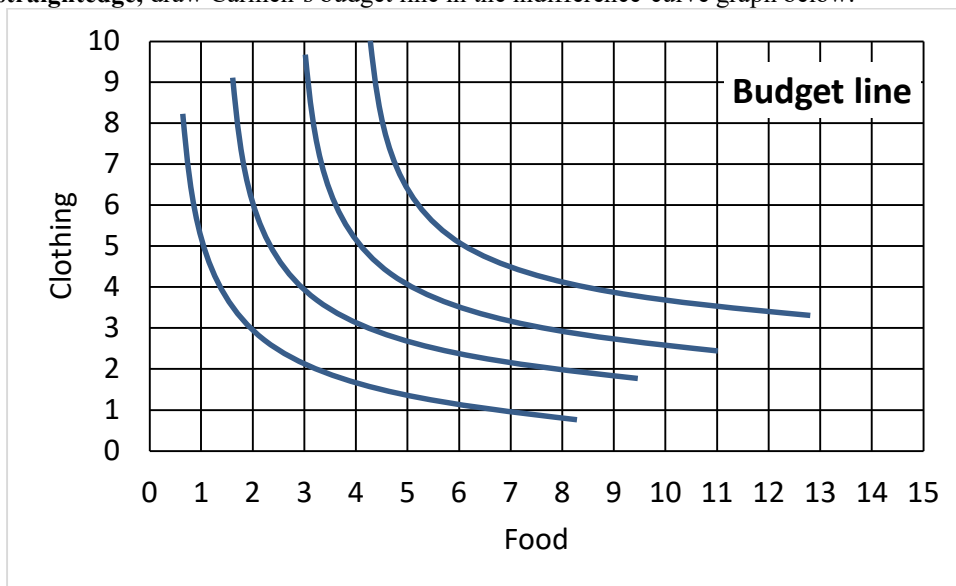
Assume this country's economy is in competitive equilibrium in all markets and the price of a unit of food is \$4.

- c. What must be the price of a unit of clothing?

\$

Carmen is a consumer in this economy. She has an income of \$40.

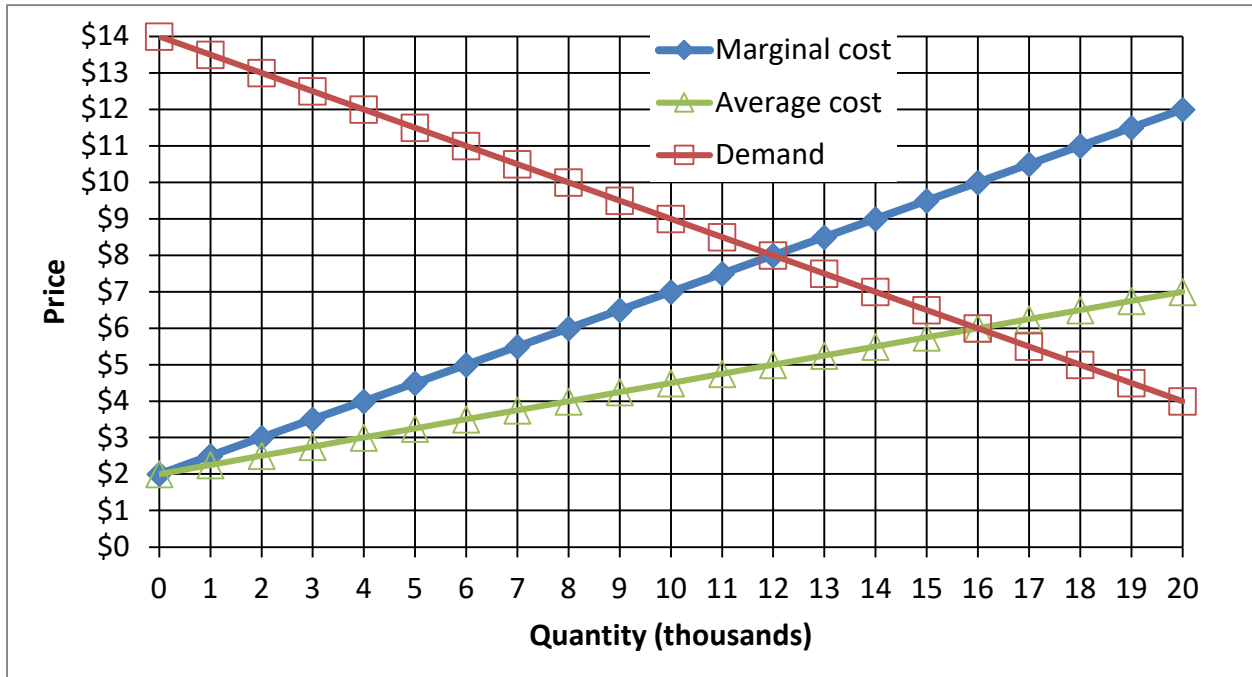
- d. **Using a straightedge**, draw Carmen's budget line in the indifference-curve graph below.



- e. What is **Carmen's** opportunity cost of a unit of food?
- f. What is **Carmen's** opportunity cost of a unit of clothing?
- g. How many units of clothing will Carmen choose to purchase?
- h. At **Carmen's** chosen bundle, what is her marginal rate of substitution, that is, the $|\text{slope}|$ of her indifference curve at her chosen bundle? (Give a number.)

units of clothing
units of food
units of clothing

(9) [Monopoly: 12 pts] Better Putter Mini-golf course is the only mini-golf course in town, so it enjoys a local monopoly. Its marginal cost, average cost, and demand curves are shown below.



Assume that the mini-golf course must charge the same price on every admission sold.

- Using a straightedge, draw and label the mini-golf course's marginal revenue curve.
- Compute the mini-golf course's profit-maximizing quantity.
- Compute the price that the mini-golf course would charge.
- Compute the mini-golf course's profits.
- Compute consumer surplus.
- Compute the social deadweight loss from the mini-golf course's monopoly pricing.

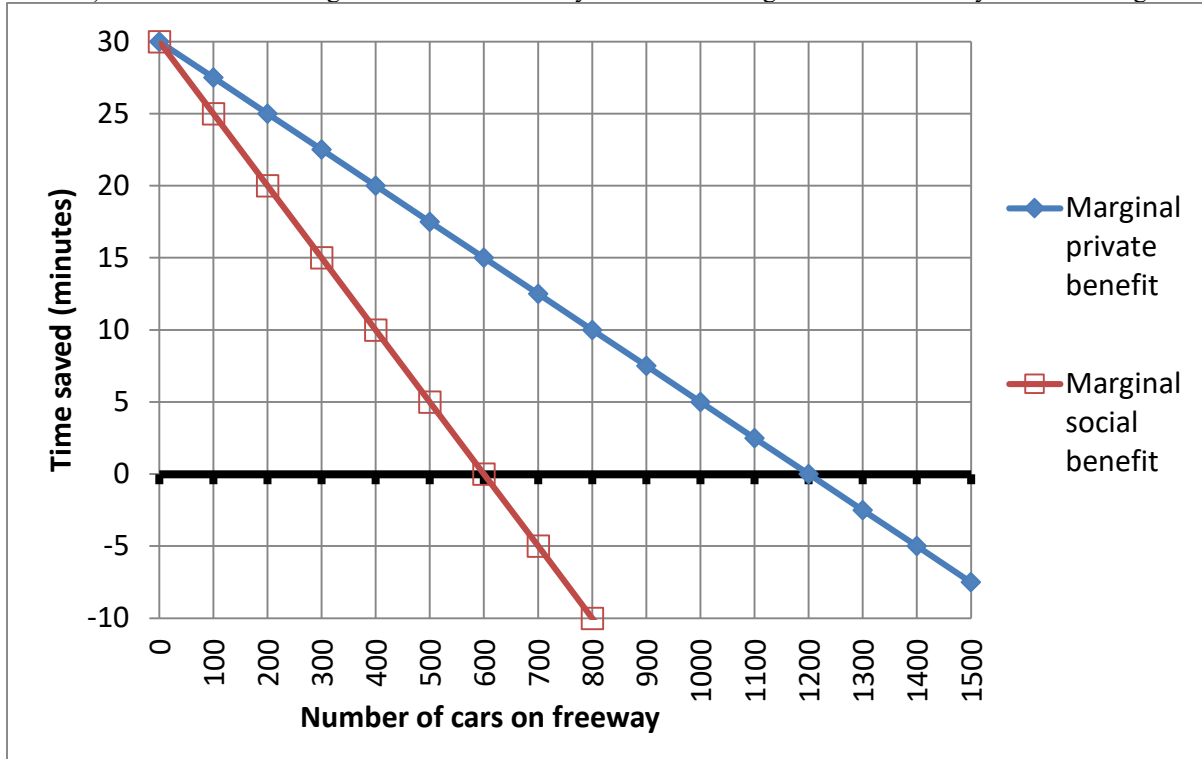
	thousand
\$	
\$	thousand
\$	thousand
\$	thousand

(10) [Nonrival goods: 6 pts] A city government will offer a free outdoor concert series during the summer in a neighborhood park. About **1000** people are likely to enjoy the concerts. Each concert costs **\$4000** to produce. Let Q denote the number of concerts. A typical individual person's marginal benefit from the concert series is given by the following expression: $MB = 20 - 2Q$.

- How many concerts would a typical *individual* pay for, for their private enjoyment?
- Give an expression for the marginal social benefit from the concert series. [Hint: This must be a formula containing one variable: Q .]
- Compute Q^* the socially-optimal number of concerts.

	concerts
MSB =	
	concerts

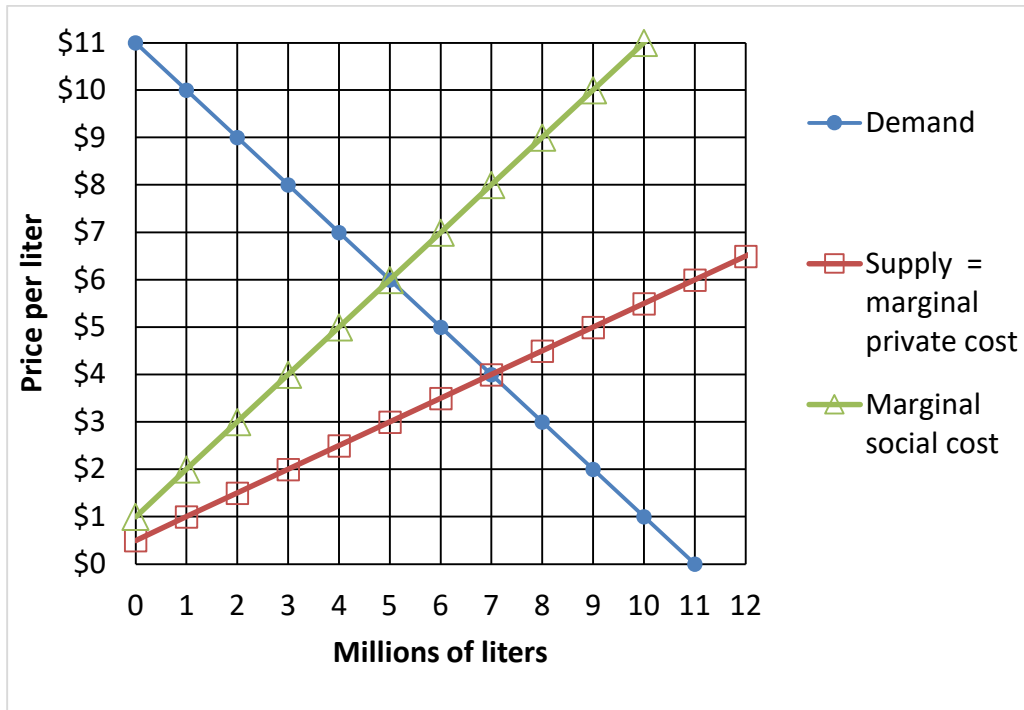
(11) [Common property resources: 6 pts] A certain freeway can easily become congested. It is the quickest route to downtown, but during rush hour, when one car enters the freeway, all the cars already on the freeway slow down a bit. The graph below shows the average time saved by each car when it enters the freeway (“marginal private benefit”), and the change in total time saved by all cars when another car enters the freeway (“marginal social benefit”). Note that the change in total time saved by all cars turns negative as the freeway becomes congested.



- How many cars will enter the freeway if entry onto the freeway is unregulated?
- What is the socially-optimal number of cars on the freeway—that is, the number of cars that maximizes total time saved by all cars on the freeway?
- Suppose a typical driver is willing to pay \$1 for each five minutes saved by entering the freeway. What toll (in dollars) would ensure that the optimal number of cars entered the freeway?

	cars
	cars
\$	

(12) [Externalities: 12 pts] The graph below shows the market for a particular chemical that generates greenhouse gases, an external cost born by other people. Therefore, in addition to demand and supply curves, a curve representing marginal social cost is shown.



- Compute the (unregulated) competitive equilibrium price.
- Compute the (unregulated) competitive equilibrium quantity.
- Compute the economically efficient (or socially optimal) quantity.
- Compute the deadweight loss from unregulated competition.
- To eliminate this deadweight loss, should the government enact a *tax* or a *subsidy*?
- What should be the tax rate or subsidy rate?

\$	per liter
	million liters
	million liters
\$	million
\$	per liter

(13) [Regulating pollution: 19 pts] Five factories are each producing one unit of pollution per year. The government has determined that total pollution must be reduced to 2 units per year (a reduction of 3 units). The cost of cleaning up pollution at each factory is given below.

Factory	A	B	C	D	E
Annual cost of cleaning up pollution	\$5	\$35	\$25	\$45	\$15

Command-and-control:

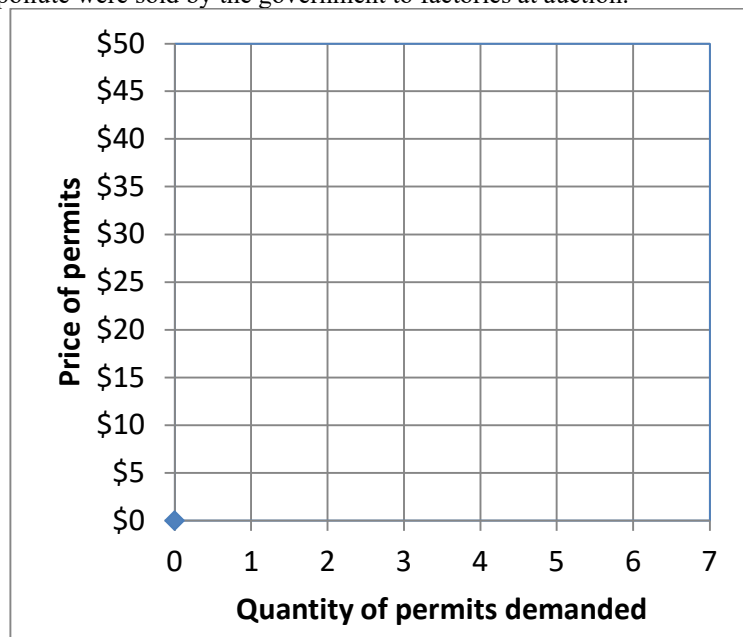
- a. To minimize the total cost of cleaning up, which 3 factories should be commanded to clean up? Give their letters.
- b. What would be the total cost of cleaning up for these 3 factories together?

\$

Now suppose the government does not know each factory's cost of cleaning up, so the command-and-control approach is infeasible. Consider the following alternative approaches.

Auction: Suppose 2 permits (or waivers) to pollute were sold by the government to factories at auction.

- c. [5 pts] Draw the factories' demand curve for permits in the graph at right. (Be sure to draw correct "stairsteps.")



In this auction, the price starts at \$0 and rises in increments of \$10.

- d. Which 2 factories would win the permits? Give their letters.
- e. What would be the final auction price of a permit to pollute?
- f. What would be the total cost of cleaning up for those 3 factories that did not win permits in the auction?

\$
\$

Pollution fee: Suppose the government imposed a fee for pollution. Factories could either pay the fee or pay the cost of cleaning up.

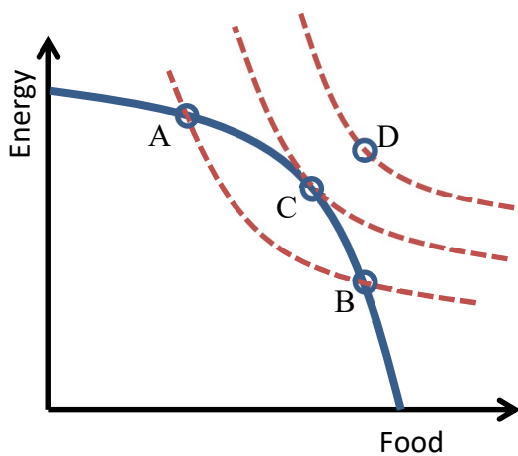
- g. What fee would reduce the amount of pollution to 2 units: \$0, \$10, \$20, \$30, \$40, \$50, or \$60?
- h. What would be the total cost of cleaning up for those 3 factories that chose not to pay the fee?

\$
\$

III. Critical thinking: Write a one-paragraph essay answering *one* question below (your choice). [4 pts]

- (1) The graph below describes the economy of Fredonia. The solid curve is Fredonia's production possibility curve and the dotted curves are indifference curves for a representative consumer. Only two goods are produced in Fredonia—food and energy—but all markets are competitive. Unfortunately, the government of Fredonia has imposed a price floor on energy, raising the price to consumers. So now where is Fredonia's economy—point A, B, C, or D? Why?
- (2) The graph below describes the economy of Fredonia. The solid curve is Fredonia's production possibility curve and the dashed curves are indifference curves for a representative consumer. Both industries are competitive. The food industry causes no externalities but the energy industry causes substantial external costs, so that too much energy is produced compared to the efficient quantity. So where is Fredonia's economy—point A, B, C, or D? Why?

Please circle the question you are answering. Write your answer below. Full credit requires correct economic reasoning, legible writing, good grammar including complete sentences, and accurate spelling.



[end of exam]