## EXAMINATION 3 VERSION A
"Choices Underlying Supply and Demand"
November 5, 2021

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 100.

I. Multiple choice: Please circle the one best answer to each question. [1 pt each, 14 pts total]

(1) In the graph below, the rotation of the budget line could be caused by
a.   an increase in income.
b.   a decrease in income.
c.   an increase in the price of food.
d.   a decrease in the price of food.
e.   an increase in the price of clothing.
f.   a decrease in the price of clothing.
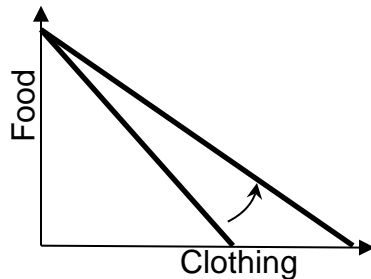
(2) If two bundles are on the same indifference curve, then they
a.   cost the same amount.
b.   are equally preferred by the consumer.
c.   include identical amounts of all goods.
d.   are equally affordable.

(3) 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.
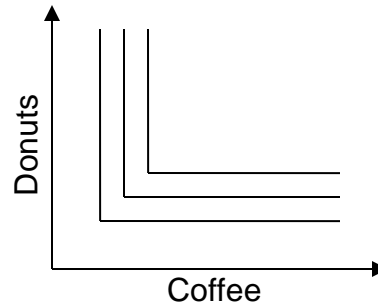
(4) The Springfield City Swimming Pool is now open 10 hours a day. Suppose a study shows that the marginal benefit of keeping the pool open is $40 per hour, and the marginal cost is $20. If these numbers are accurate, then Springfield would be better off
a.   keeping the City Pool open more hours.
b.   keeping the City Pool open fewer hours.
c.   making no change in the City Pool hours.
d.   Cannot be determined from information given.

(5) Production of electric cars is increasing. An increase in the number of companies who produce electric cars is called a change at the
a. extensive margin.
b. intensive margin.
c. marginal product.
d. marginal revenue.

(6) Which of the following is an economic cost but not an accounting cost?
a. Payments for electricity, raw materials, and supplies.
b. Lease payments for equipment and buildings.
c. The opportunity cost of the business owner's time spent running the business.
d. Wages paid to workers.
e. All of the above.

(7) Price times a firm's quantity of output equals the firm's
a. total revenue.
b. average revenue.
c. marginal revenue.
d. total cost.
e. average cost.
f. marginal cost.

(8) The increase in a firm's total revenue from producing and selling one more unit of output by definition equals the firm's
a. total revenue.
b. average revenue.
c. marginal revenue.
d. total cost.
e. average cost.
f. marginal cost.

(9) The slope of the firm's total cost curve by definition equals the firm's
a. total revenue.
b. average revenue.
c. marginal revenue.
d. total cost.
e. average cost.
f. marginal cost.

(10) A firm's total cost divided by its total output by definition equals the firm's
a. total revenue.
b. average revenue.
c. marginal revenue.
d. total cost.
e. average cost.
f. marginal cost.

(11) A small firm in a big market maximizes its profit by
a. adjusting its price so that price equals marginal cost.
b. adjusting its output quantity so that price equals marginal cost.
c. shifting its marginal cost curve up or down so that price equals marginal cost at its desired output level.
d. all of the above.

(12) A cost that you cannot avoid no matter what action you take is called
a. an opportunity cost.
b. a marginal cost.
c. a variable cost.
d. a sunk cost.
e. an average cost.

(13) The formula for discounting shows that the present discounted value of a payment to be received in the future is *greater,*
a. the lower the interest rate (or discount rate).
b. the longer the wait until the payment is received.
c. Both (a) and (b).
d. Neither (a) nor (b).

(14) When firms *enter* an industry, this has the effect of shifting the short-run supply curve
a. to the right.
b. to the left.
c. up.
d. Cannot be determined from information given.

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) [Budget line: 10 pts] Adam has $600 to spend on food and clothing. The price of food is $6. The price of clothing is $12.
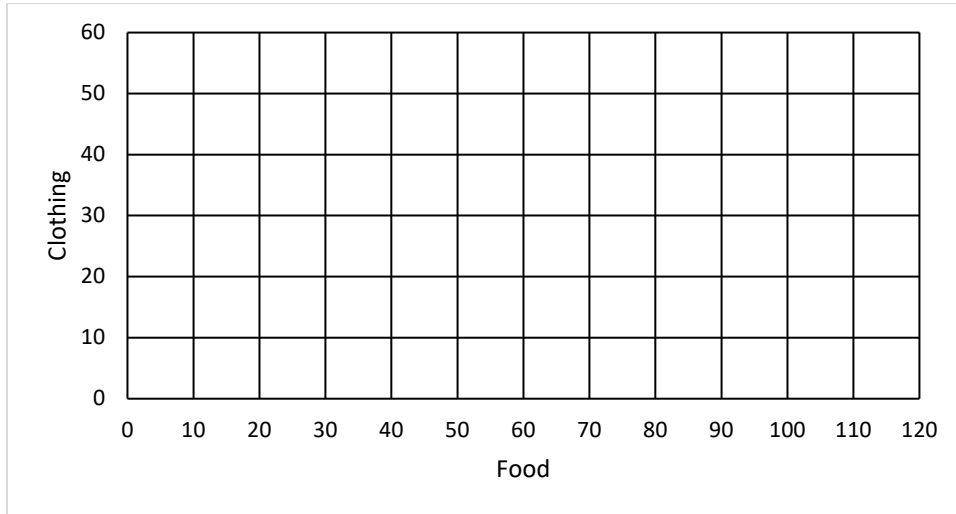
a. **Using a straightedge**, carefully draw Adam's budget line

Determine whether the following combinations of goods are *exactly affordable, affordable with money left over,* or *not affordable* for Adam.

  b. 30 units of clothing and 40 units of food.

  c. 40 units of clothing and 30 units of food.

  d. 20 units of clothing and 50 units of food.

Assume that Adam spends all his income on food and clothing.
  e. What is Adam's opportunity cost of a unit of food?

units of clothing

(2) [Consumer choice and demand: 14 pts] The indifference curves in the graph below represent Barbara's preferences for drinks and sandwiches.
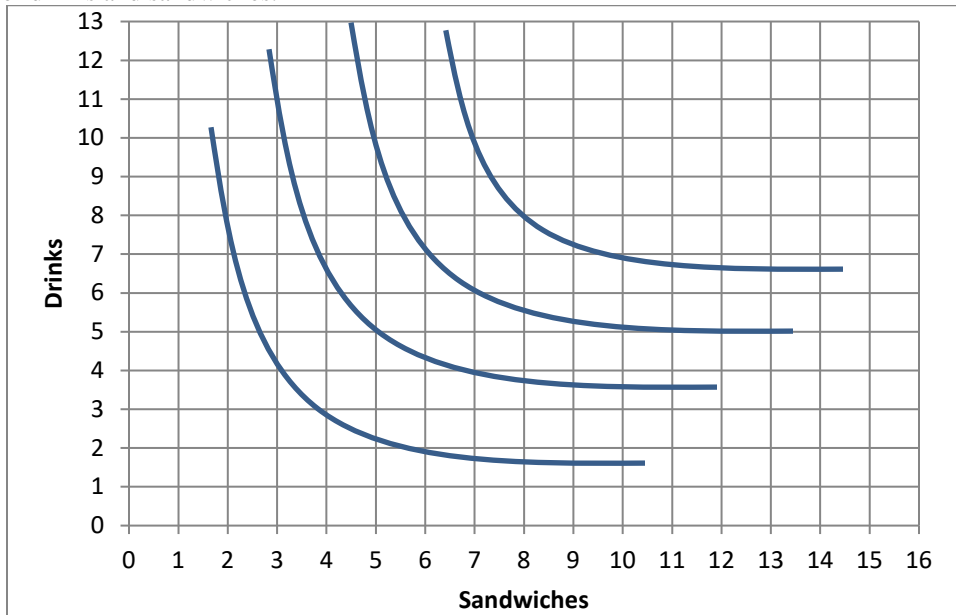
a. Would Barbara rather have 11 drinks and 3 sandwiches, or 7 drinks and 6 sandwiches?

drinks and	sandwiches

b. Would Barbara rather have 10 drinks and 7 sandwiches, or 5 drinks and 13 sandwiches?

|	
drinks and	sandwiches

Suppose Barbara has a budget of $40 to spend on drinks and sandwiches. The price of drinks is $4.

c. **Using a straightedge**, carefully draw Barbara's budget line when the price of sandwiches is $4. Label this budget line "A".

d. How many sandwiches will Barbara buy if the price of sandwiches is $4?

sandwiches

e. **Using a straightedge**, carefully draw Barbara's budget line when the price of sandwiches is $8. Label this budget line "B".

f. How many sandwiches will Barbara buy if the price of sandwiches is $8?

sandwiches

g. Plot two points on Barbara's demand curve for sandwiches, and sketch Barbara's demand curve at right.
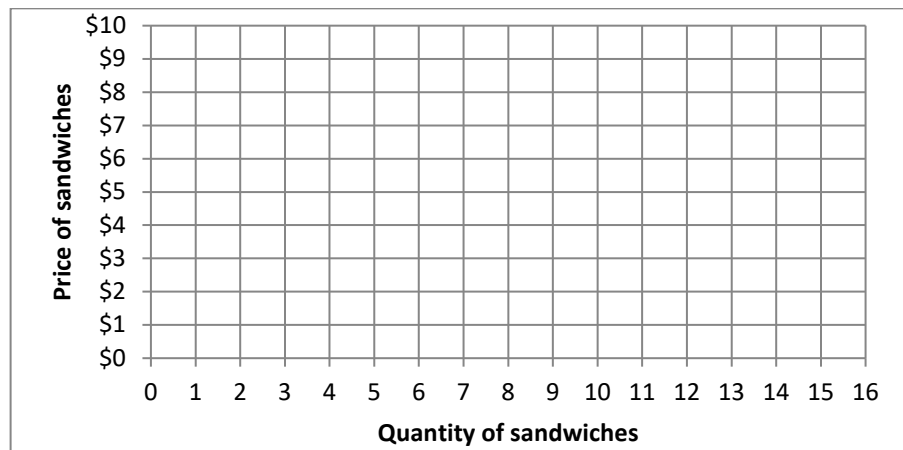
(3) [Rational choice: 10 pts] Ellwood City is installing traffic signals. The city manager has obtained cost estimates (there is some discount for volume purchases) and computed benefit estimates (where higher-benefit locations would be served first). The following are total cost and total benefit estimates.

Traffic signals	Total cost	Total benefit	Marginal cost per signal	Marginal benefit per signal
0	$ 0	$0		
			$　　　　thousand	$　　　　thousand
5	$15 thousand	$20 thousand		
			$　　　　thousand	$　　　　thousand
10	$25 thousand	$35 thousand		
			$　　　　thousand	$　　　　thousand
15	$30 thousand	$38 thousand		
			$　　　　thousand	$　　　　thousand
20	$35 thousand	$40 thousand		

a. [4 pts] Compute the marginal cost schedule. Insert your answers above.
b. [4 pts] Compute the marginal benefit schedule. Insert your answers above.
c. [2 pts] How many traffic signals should Ellwood City install? (Answer must be 0, 5, 10, 15, or 20).

　　　　signals

(4) [Discounting: 4 pts] Answer the following questions, assuming the interest rate is **5 %.**

a. Suppose a particular project will *cost* a firm $600 today, but will bring $200 in revenue one year from today, and $500 in revenue two years from today. Compute the *net present value* of this project to the nearest whole dollar.

$

b. Suppose a firm expects to enjoy $2 million in profit every year, perpetually, beginning a year from today. Compute the value of the firm.

$　　　　million

(5) [Short-run cost curves and supply: 20 pts] ABC Manufacturing Company makes a small part used in automobiles. ABC 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.
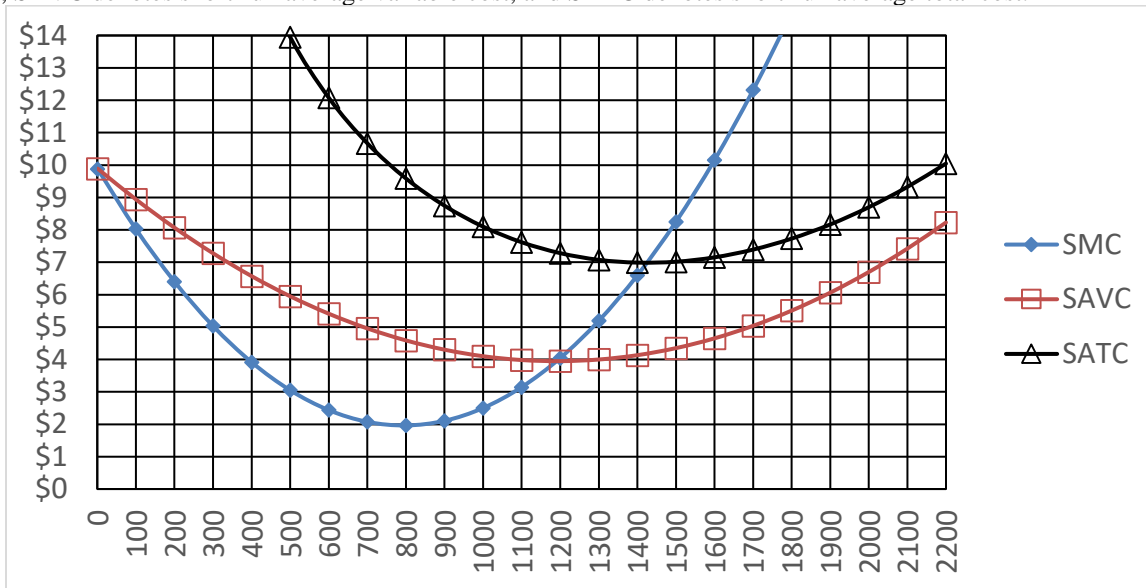
Suppose the company were currently producing 500 parts for some unknown reason.

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

$ _____ thousand

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

$ _____ thousand

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

$ _____ thousand

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.)

parts

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

i. Suppose the price of parts is $5. How many parts should the company produce? (Give an answer to the nearest hundred.)

parts

j. Will the company make a *profit* or a *loss* at a price of $5?

(6) [Long-run competitive equilibrium: 24 pts] The graph below shows the market for leg warmers, which is competitive. Assume all producers and potential producers have the same costs as each other.
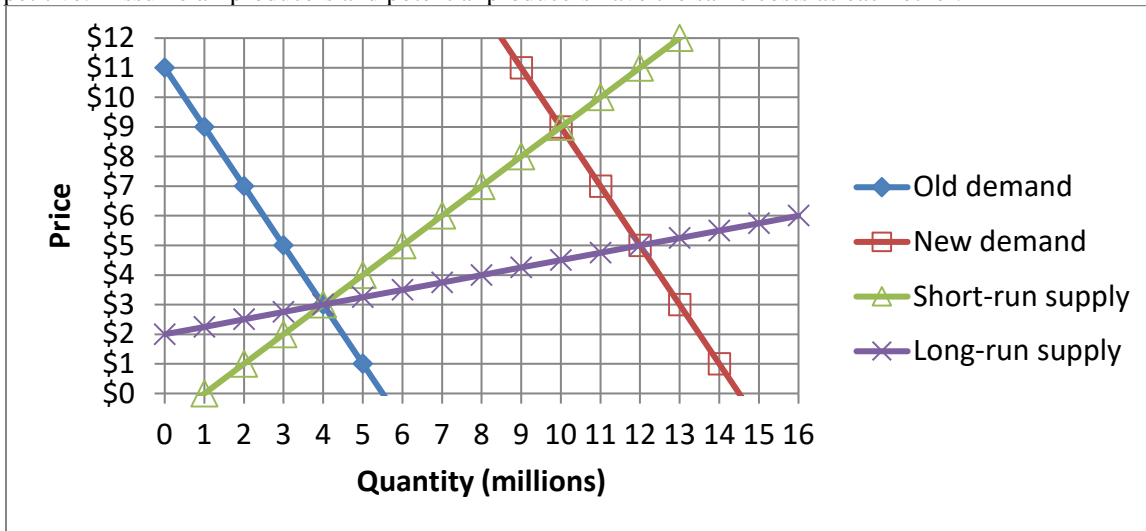
Initially the market is in long-run equilibrium, with the demand curve given by "old demand" and the short-run supply curve given by "short-run supply" as shown in the graph.

a. What is the initial equilibrium price?

$

b. What is the initial equilibrium quantity?

million

c. What is the average cost of production for firms in this industry?

$

Suppose that leg warmers become popular, and the demand shifts to "new demand." Consider the **short-run** market response to this demand shift.

d. What is the new equilibrium price in the short run?

$

e. What is the new equilibrium quantity in the short run?

million

f. Are firms in this industry making economic *profits, losses*, or just *breaking even*?

Now, consider the **long-run** market response to this demand shift.

g. Given your answer to (f) above, will existing firms try to *exit* the industry or will new firms try to *enter* the industry?

h. What is the new equilibrium price in the long run?

$

i. What is the new equilibrium quantity in the long run?

million

j. What is the new long-run average cost of production for firms in this industry?

$

k. Has the number of firms in this industry *increased, decreased*, or remained *constant*?

l. Should this industry be called a *constant-cost* industry, an *increasing-cost* industry, or a *decreasing-cost* industry?

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

(1) Suppose you are shopping for a new computer. You find a good one at Store A for $500. You pay a nonrefundable deposit of $200, expecting to pay the balance of $300 and pick up your computer next week. Then you discover that Store B will sell you the same computer for $350. Will you buy your computer from Store A or Store B? Justify your answer, identifying any sunk cost.

(2) Suppose you operate a lawn-mowing business in a competitive market, where everyone charges about $20 for an average-size lawn. In other words, you can take the price of $20 as given. You review your costs to decide what to do. You discover that your average cost per lawn is about $10, but your marginal cost per lawn is about $30. Should you expand your business, downsize it, or neither? Justify your answer.

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]