Signature: _____

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QUIZ 2 VERSION A
"Competitive Firms"

INSTRUCTIONS: This exam is closed-book, closed-notes. Simple calculators are permitted, but graphing calculators or calculators with alphabetical keyboards are NOT permitted. Mobile phones or other wireless devices are NOT permitted. Points will be subtracted for illegible writing or incorrect rounding. Point values for each question are noted in brackets.

I. Multiple choice: Circle the one best answer to each question. [3 pts each: 24 pts total]

(1) If at a certain level of output, marginal cost is *less* than average cost, then average cost must be
a. increasing.
b. decreasing.
c. at its minimum point.
d. Cannot be determined from information given.

(2) Consider the graph below of a firm's marginal cost (MC) and marginal revenue (MR) curves. Suppose the firm is currently producing 300 units of output for some reason. It can increase its profit by
a. increasing its output.
b. decreasing its output.
c. increasing or decreasing its output.
d. It cannot increase its profit by changing its output.
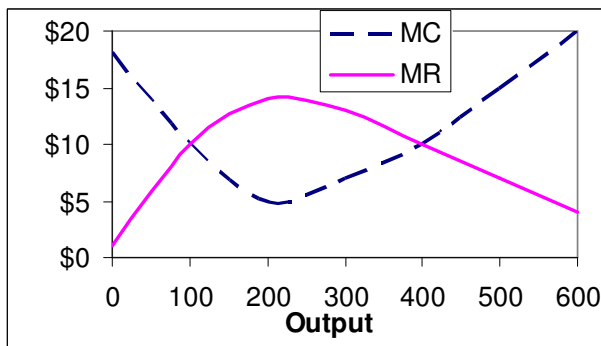
(3) If a firm takes the market price as given, its *marginal revenue* curve is
a. a downward-sloping line.
b. a horizontal line.
c. an upward-sloping line through the origin.
d. a U-shaped curve.

(4) ABC Company is a small firm in a big market and therefore takes the market price as given. Its marginal cost (MC) and average cost (AC) curves are shown below. To maximize profit, ABC Company should set its output at
a. 30 units.
b. 40 units.
c. 50 units.
d. 60 units.
e. 70 units.
f. Cannot be determined without knowing market price.
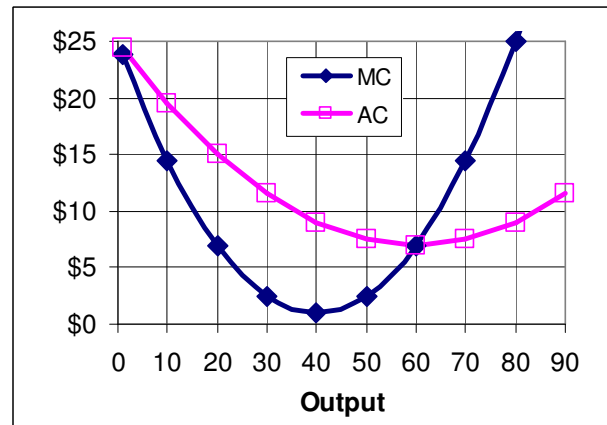
(5) In the short run, which kind of cost does *not* depend on the level of output?
a. Fixed cost.
b. Variable cost.
c. Marginal cost
d. Total cost.

(6) In the short run, a firm should continue to operate only if its revenue is greater than its
a.   fixed cost.
b.   variable cost.
c.   total cost.
d.   producer surplus.

(7) Existing firms will try to exit an industry in the long run if the market price
a.   is less than average cost.
b.   equals average cost.
c.   is greater than average cost.
d.   none of the above.

(8) In *long-run* competitive equilibrium,
a.   price equals marginal cost.
b.   price equals average cost.
c.   average cost equals marginal cost.
d.   all of the above.

II. Problems: Insert your answer to each question below in the box provided. Feel free to use the margins 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) [Profit maximization: 20 pts] Suppose a firm's total revenue function is given by $Rev(Q) = 15Q - (Q^2/20)$, and its total cost function is given by $TC(Q) = 3Q + (Q^2/40)$. Find the following, showing your work and circling your final answers.

a. Find the firm's marginal revenue function MR(Q).

b. Does this firm take price as given? Why or why not?

c. Find the firm's marginal cost function MC(Q).

d. Compute the firm's profit-maximizing level of output Q*. Show your work and circle your final answer.

(2) [Profit maximization while taking price as given: 10 pts] Suppose the market price of an item is \$9 and a firm that produces that item has a total cost function given by $TC(Q) = 5Q + (Q^2/200)$. Assume the firm takes price as given. Answer the following questions, showing your work and circling your final answers.

a. How much output (Q) should the firm produce to maximize profit?

b. How much profit will the firm enjoy?

(3) [Short-run cost curves and supply: 20 pts] Acme Flashlight Company makes flashlights. It is a small firm in a big market, and therefore takes its output price as given. In the short run, Acme 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.
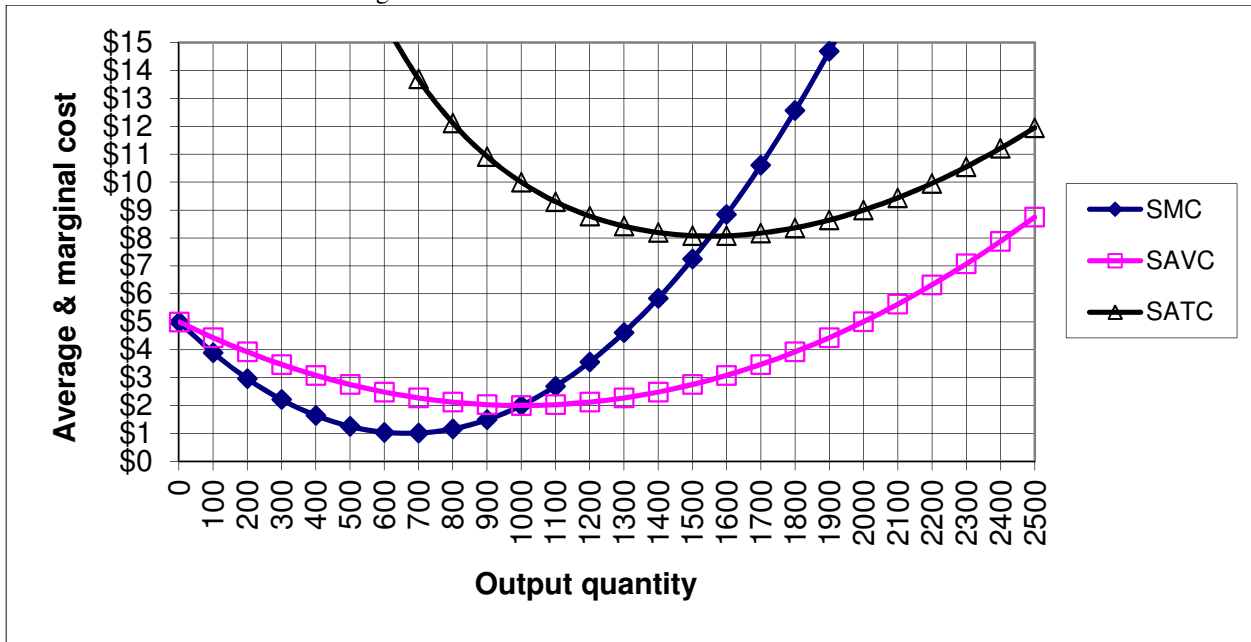
a. Suppose Acme were currently producing 700 flashlights for some unknown reason. If Acme produced one more flashlight, by how much would its total cost increase? That is, what would be the *change in cost* as Acme increased output from 700 to 701 flashlights? (Give an answer to the nearest dollar.)

$ ___

b. Suppose Acme were currently producing 1500 flashlights for some unknown reason. Compute Acme's short-run total cost. (Give an answer to the nearest thousand dollars.)

$ ___ thousand

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

$ ___

d. What is Acme'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.)

$ ___

e. Suppose the price of flashlights is $9. How many flashlights should Acme produce to maximize profit? (Give an answer to the nearest hundred.)

___ flashlights

f. Will Acme make a *profit* or a *loss* at a price of $9? Or will it *break even*?

g. Suppose the price of flashlights is $6 How many flashlights should Acme produce to maximize profit? (Give an answer to the nearest hundred.)

___ flashlights

h. Will Acme make a *profit* or a *loss* at a price of $6? Or will it *break even*?

i. Suppose the price of flashlights is $1 How many flashlights should Acme produce to maximize profit? (Give an answer to the nearest hundred.)

___ flashlights

j. Will Acme make a *profit* or a *loss* at a price of $1? Or will it *break even*?

(4) [Long-run cost and supply: 20 pts] Suppose a firm faces a (long-run) total cost function given by
$TC(q) = q^3 - 100 q^2 + 2520 q$. Find the following, showing your work and circling your final answers.

a. Find the firm's marginal cost function MC(q).

b. Find the firm's average cost function AC(q).

c. Compute the firm's breakeven price (that is, minimum average cost).

d. Suppose all firms in this industry have the same costs, and these costs are not affected by other firms in the same industry or by total industry output. Further assume the industry enjoys free entry and exit. Draw and label the *long-run industry supply curve* in the graph below.
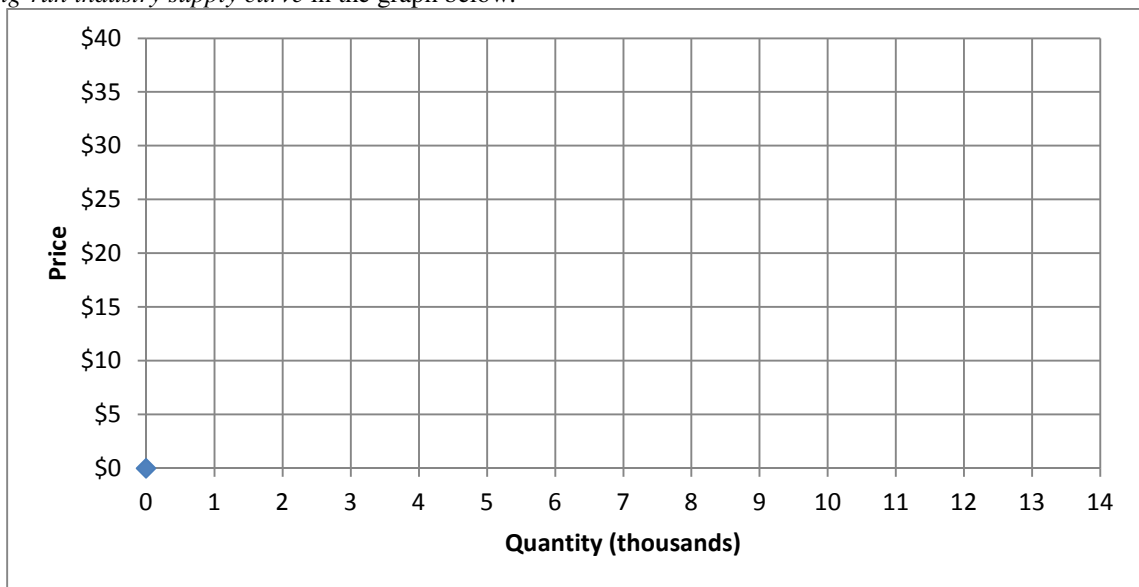
III. Critical thinking [6 pts]

Using the graph in problem (3) above, compute Acme Company's short-run fixed cost (SFC). Show your work and explain your reasoning. Please circle your final answer.

[end of quiz]