# EXAMINATION 4  VERSION A
## "Perfect and Imperfect Competition"
## May 1, 2013

INSTRUCTIONS:  This exam is closed-book, closed-notes.  Simple calculators are permitted, but graphing calculators or calculators with alphabetical keyboards 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, 10 pts total]

(1) A perfectly competitive firm expects that if it increases its output, this will cause the price to
a.   increase.
b.   decrease.
c.   stay the same.
d.   cannot be determined from information given.

(2) To pass the compensation test of Kaldor and Hicks, a change in the economy must result in
a.   winners but no losers.
b.   gains to winners that exceed any losses to losers.
c.   at least some winners.
d.   cost savings for the government.
e.   a rise in wages, salaries, and other compensation.

(3) Suppose for some reason that the quantity traded in a market for petroleum is 35 million, but the market is not in equilibrium.  Rather, at this quantity, the height of the supply curve is $90 and the height of the demand curve is $120.  Then producing one more unit of petroleum would
a.   decrease social welfare by $30.
b.   increase social welfare by $30.
c.   decrease social welfare by $90.
d.   increase social welfare by $120.
e.   decrease social welfare by $210.
f.   Cannot be determined without knowing the equilibrium price.

(4) Suppose that for some reason, at current levels of output, Firm A's marginal cost is $4 and Firm B's marginal cost is $10.  If one unit of output is shifted from Firm A to Firm B, then total industry costs will
a.   increase by $4.
b.   increase by $6.
c.   remain unchanged.
d.   decrease by $4.
e.   decrease by $6.

(5) If every consumer in the economy faces the same prices, then every consumer
a.   has exactly the same income.
b.   will choose exactly the same combinations, or bundles, of goods.
c.   has exactly the same budget line.
d.   will choose combinations of goods where their marginal rates of substitution are exactly identical.

(6) Suppose a hotdog vendor sells 20 hotdogs per hour if the price is $2, and sells 21 hotdogs if the price is $1.95.  The vendor's marginal revenue of the 21st hotdog is therefore
a.   $0.05 .
b.   $0.95 .
c.   $1.00 .
d.   $1.95 .
e.   $2.00 .
f.   $20.00 .

(7) After a cartel agreement is reached, each cartel member has an incentive to cheat by
a.   producing less than its quota of output.
b.   raising its price higher than the cartel's agreed price.
c.   shutting down all production.
d.   producing more than its quota of output.

(8) The first federal antitrust law in the United States, enacted in 1890, was the
a.   Sherman Act.
b.   Wagner Act.
c.   Norris-LaGuardia Act.
d.   Robinson-Patman Act.

(9) Suppose that computer chip industry has two firms, each of which has the same marginal cost, and that the market elasticity of demand is -5. If the industry is a Cournot oligopoly, the markup of price over marginal cost (P-MC)/P must be

a.  2%.
b.  5%.
c.  10%.
d.  50%.
e.  Cannot be determined from information given.

(10) Products are said to be "differentiated" if
a.  one can buy them in fractional amounts.
b.  consumers do not view them as perfect substitutes.
c.  they are sold through different retail channels (stores, online, catalogs, etc.)
d.  different consumers buy different quantities of them.

**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) [Economy-wide efficiency: 12 pts]  Suppose there are two firms in the industry producing calculators, with the marginal cost curves and average cost curves shown in the graph below.
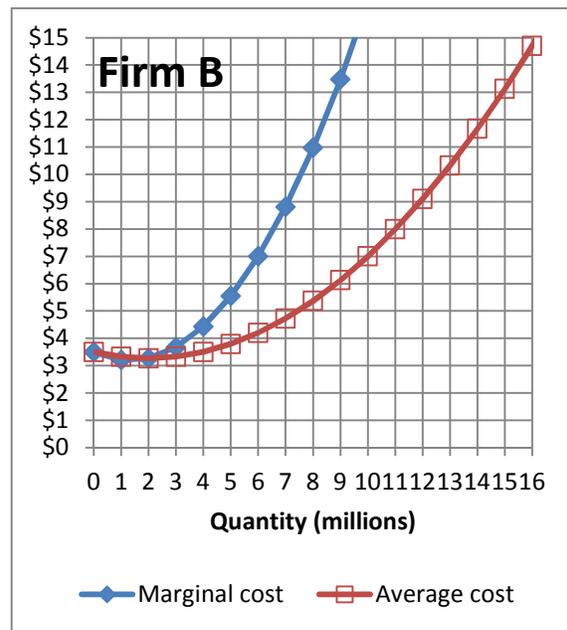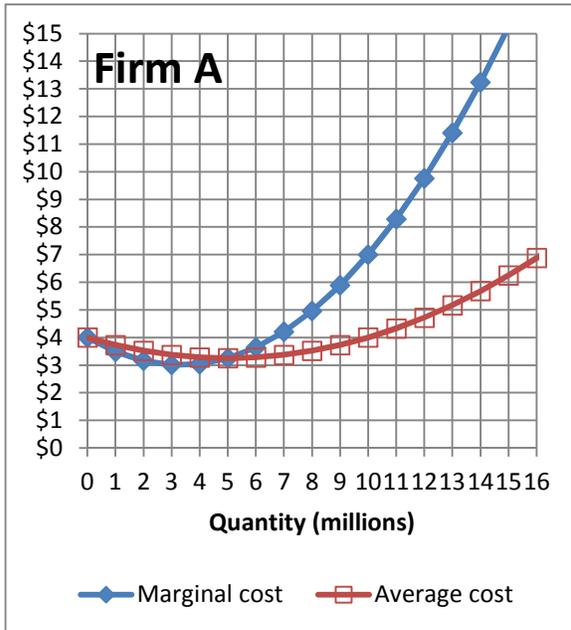


a. Suppose Firm A is currently producing **8** million calculators.  If Firm A increases production by one calculator, by how much will its total cost increase?  (Give an answer to the nearest whole dollar.)

$

b. Suppose Firm B is currently producing **8** million calculators.  If Firm B increases production by one calculator, by how much will its total cost increase?  (Give an answer to the nearest whole dollar.)

$

First assume the firms' output levels must be set by a government planner.  The planner wants the firms to produce a total of **16** million calculators, but total industry cost (that is, the combined costs for both firms) must be as low as possible.

c. Which firm should be instructed to produce more output—*Firm A* or *Firm B*, or should they produce an *equal* amount of output to make total industry cost as low as possible?

d. How much output should Firm A produce?

million

e. How much output should Firm B produce?

million

Alternatively assume there is no government planner.  Assume instead that the two firms are competitive and that they each maximize their own profit while taking price as given.

f. What price for calculators will motivate the two firms to produce a total of **16** million calculators at lowest total industry cost?

$

(2) [Economy-wide efficiency: 20 pts]  The graph below shows a country's production possibility curve.  Assume the country is at point A, where the slope of the production possibility curve equals **–4.**

Food

A
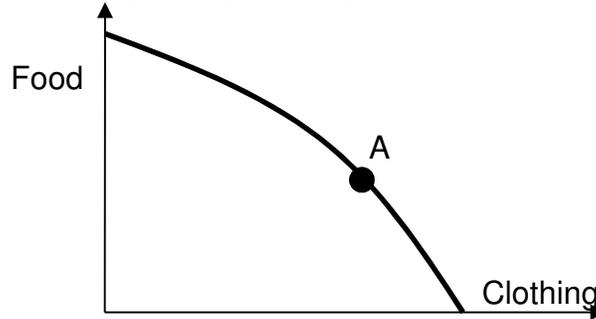
Clothing

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?
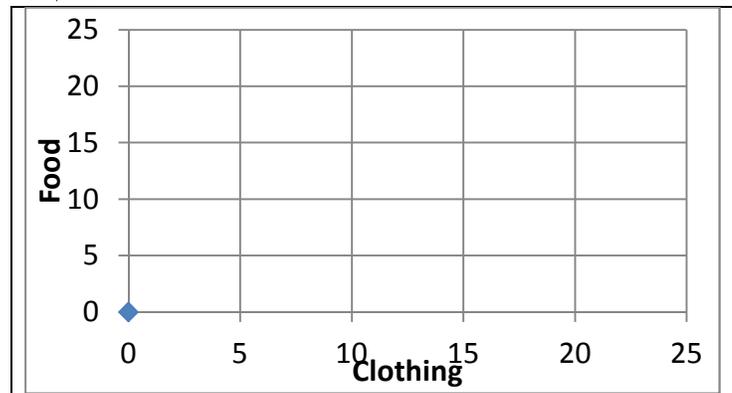
| units of clothing |
| --- |
| units of food |

Assume this economy is in competitive equilibrium in all markets and the price of a unit of clothing is $12.

c. What must be the marginal cost of clothing, for all firms producing clothing in this economy?

d. What must be the price of a unit of food?

e. What must be the marginal cost of food, for all firms producing food in this economy?

| $ |
| --- |
| $ |
| $ |

Brian, a consumer in this economy, has an income of $60.

f. [4 pts]  *Using a straightedge,* draw Brian's budget line in the graph at right.

25
20
15
**Food**
10
5
0

0    5    10    15    20    25
**Clothing**

g. What is the slope of Brian's budget line?

h. What is Brian's opportunity cost of a unit of clothing?  That is, if he is spending all his income, but then decides to buy another unit of clothing, how many units of food must he give up?

i. What is Brian's opportunity cost of a unit of food?  That is, if he is spending all his income, but then decides to buy another unit of food, how many units of clothing must he give up?

j. What is Brian's marginal rate of substitution of clothing for food—that is, the slope of his indifference curve at his preferred bundle on this budget line?

| |
| --- |
| units of food |
| units of clothing |
| |

(3) [Monopoly, perfect price discrimination: 20 pts]  Suppose Acme High-tech Company has a patent for a particular high-tech device.  Its demand, marginal revenue, and marginal cost curves are shown below.  Assume for simplicity that marginal cost equals average cost.
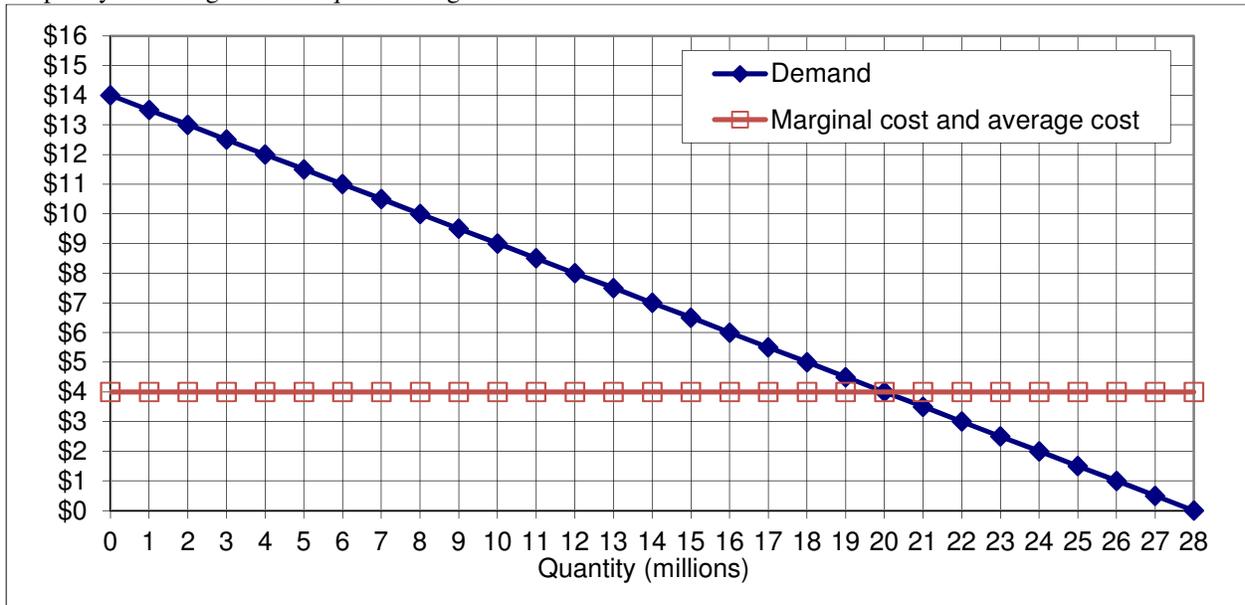


First, assume Acme must charge the *same price* to all its customers.

   a. **Using a straightedge,** draw and label Acme's marginal revenue curve.

| | |
|---|---|
| b. What quantity should Acme produce to maximize profits? | million |
| c. What price should Acme charge? | $ |
| d. Compute Acme's profit. | $  million |
| e. Compute the deadweight loss from single-price monopoly. | $  million |

Now, alternatively assume that Acme can somehow charge a different price to each customer, based on what that customer is willing to pay.  In other words, Acme can engage in *perfect price discrimination*.

| | |
|---|---|
| f. What is the highest price Acme will charge any customer?  (Give an answer to the nearest whole dollar.) | $ |
| g. What is the lowest price Acme will charge any customer?  (Give an answer to the nearest whole dollar.) | $ |
| h. What quantity will Acme produce to maximize profit? | million |
| i. Compute Acme's profit. | $  million |
| j. Compute the deadweight loss from monopoly with perfect price discrimination. | $  million |

(4) [Competition versus collusion: 16 pts]  Suppose a small group of firms produce laundry soap.  The graph below shows the demand curve for laundry soap, and the joint marginal cost or supply curve of the group of firms.
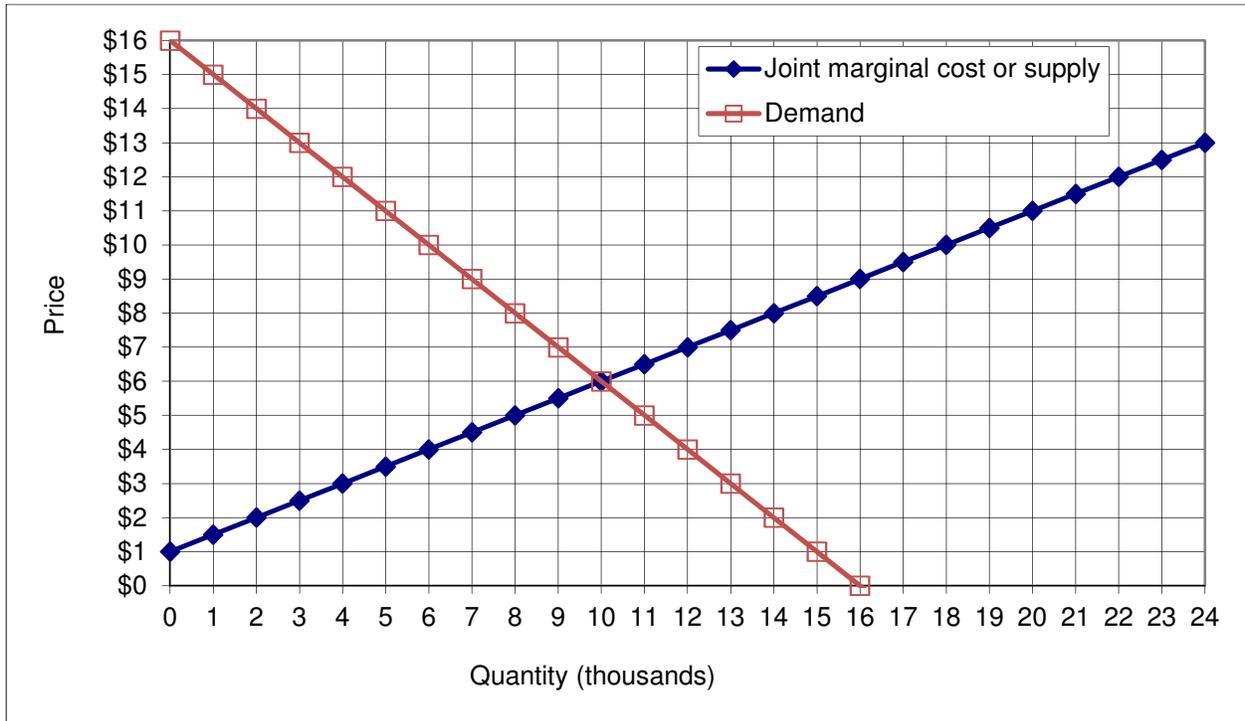


First, assume the firms *compete* with each other, each maximizing its own profit while taking the market price as given.

   a. What will be the equilibrium market quantity?

|  |
|---|
| thousand |

   b. If output increased by one more unit at any firm, total costs would increase by how much?

| $ |
|---|

   c. What will be the equilibrium market price?

| $ |
|---|

Now, alternatively assume the firms *collude* with each other, setting price jointly as a cartel to maximize the sum of their profits.

 d. *Using a straightedge*, draw and label the colluding firms' marginal revenue curve.

   e. What total quantity will the firms produce?

|  |
|---|
| thousand |

   f. If output increased by one more unit at any firm, total costs would increase by how much?

| $ |
|---|

   g. What price will the firms jointly set?

| $ |
|---|

   h. Compute the deadweight loss from collusion.

| $ | thousand |
|---|---|

(5) [Monopoly price discrimination: 8 pts]  Suppose a theatre sells tickets to both students and the general public. The theatre believes the elasticity of demand by students is –11, and the elasticity of demand by the general public is –3.

    a. If the price is increased by 3%, what will be the approximate decrease in tickets sold to students?

| | |
|---|---|
| | % |

    b. If the price is increased by 3%, what will be the approximate decrease in tickets sold to the general public?

| | |
|---|---|
| | % |

Assume the marginal cost of a seat in the theatre is $20.

    c. Compute the profit-maximizing ticket price for students.

| | |
|---|---|
| $ | |

    d. Compute the profit-maximizing ticket price for the general public.

| | |
|---|---|
| $ | |

(6) [Monopolistic competition: 14 pts]  Two ice-cream stands are positioned at opposite ends of a beach.  Yum-Yum is at the extreme left and Tasty Treat is at the extreme right, as shown in the diagram below.  The beach is 1000 yards long and there are people scattered evenly along the beach—one person per yard.
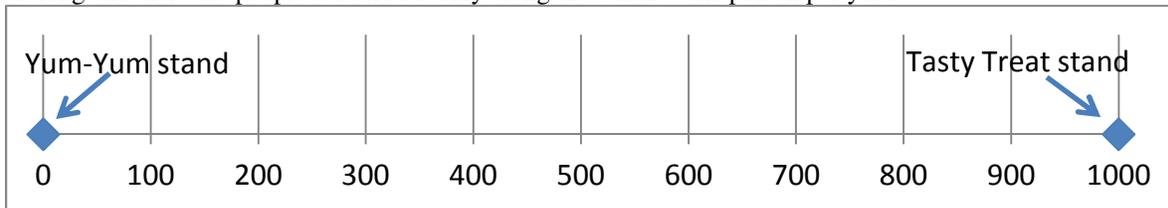


Everyone wants to buy one ice-cream cone.  The only question is where they will buy it.  No one wants to walk far. In fact, each person is willing to pay one cent to avoid walking (back and forth) one yard.  In other words, each person's total price of an ice cream cone is $P_{TOT} = P + 0.01 D$, where P is the money price they pay and D is the distance to the stand.  Naturally, each person chooses the stand with the lowest total price.

Suppose that Tasty Treat sets a money price of **$6**.  What price should Yum-Yum set?

    a. [10 pts] For each possible price in the table below, compute the number of people that choose Yum-Yum and Yum-Yum's total revenue.

| Yum-Yum's price | Number of people that choose Yum-Yum (to the nearest hundred) | Yum-Yum's total revenue |
|---|---|---|
| $2 | | $ |
| $4 | | $ |
| $6 | | $ |
| $8 | | $ |
| $10 | | $ |

Suppose for simplicity that Yum-Yum has can make ice cream at zero cost, so to maximize profit, Yum-Yum simply needs to maximize its revenue.

    b. [2 pts]  Which price in the table above would maximize Yum-Yum's revenue?

| | |
|---|---|
| $ | |

    c. [2 pts]  Now suppose alternatively that no one minds walking, so they just choose the stand with the lowest money price P.  Now what price would maximize Yum-Yum's revenue?  (Ignore the table above.  Choose any price, in dollars and cents.)

| | |
|---|---|
| $ | |

[end of exam]