

79/100

1. (15 points) This question is a variation of one of your homework problems. Please ignore time value of money for this question! That is, there is no cost to waiting.

Consider a perfectly competitive industry with 100 identical firms. Here are further details on the industry:

Each firm is operating with a fixed cost of \$1,000 and TVC of $5Q^2 + 10Q$ and the industry demand is given by $P = 400 - 2Q/19$.

a) (5 points) Given that the industry is in the short run, which is one year, that is, there is no entry and exit, how much profit would be made by each company?

x3

$$TC = 5Q^2 + 10Q + 1000$$

$$MC = 10Q + 10 = P$$

$$10Q = P - 10$$

$$Q = \frac{P - 10}{10}$$

$$100 \left(\frac{P - 10}{10} \right) = Q \text{ industry supply}$$

$$\frac{Q}{100} = \frac{P - 10}{10}$$

$$\frac{10Q}{100} = P - 10$$

$$P = \frac{Q}{10} + 10$$

$$\frac{Q}{10} + 10 = 400 - \frac{2Q}{19}$$

$$Q = 1900 \text{ of industry}$$

$$Q_{firm} = \frac{1900}{100} = 19 \checkmark$$

$$P = 400 - \frac{2(19)}{19} = 398 \text{ X}$$

$$\pi = TR - TC$$

$$= PQ - [5Q^2 + 10Q + 1000]$$

$$= (398)(19) - [5(19)^2 + 10(19) + 1000]$$

$$\boxed{= \$4567}$$

b) (10 points) Assume there is no entry. One of the firms comes up with an innovation that reduces its costs significantly which allows this firm to make higher profit year over year compared to others and accumulate significant amount of funds that will allow it to survive any loss. Then, the innovator firm would like to take over the entire industry by undercutting everyone. At what price should it offer the product?

- costs go down a lot
- accumulates surplus cash
- more and more profit

To overtake, firm needs to offer product so that shutdown rule is triggered for other firms

$$TC = 5Q^2 + 10Q + 1000$$

$$ATC = 5Q + 10 + \frac{1000}{Q}$$

$$\frac{\partial ATC}{\partial Q}$$

$$= 5 - \frac{1000}{Q^2} = 0 \rightarrow 5 = \frac{1000}{Q^2}$$

+1

Below \$398.51

$$P = 400 - \frac{2(10\sqrt{2})}{19} = \boxed{398.51} \text{ X}$$

$Q = 10\sqrt{2}$
price at which ATC is min

+5

Time Val of Money

2. (22 points) A young engineer starts a company, ITLV (Into The Ladybug Verse), to manufacture and sell a new device which is not protected under intellectual property law (that is, it can be copied). The duration of short run is 1 year, that is, it takes 1 year to commit to the fixed equipment, produce and sell. Assume that all costs are due at the beginning of the year. Revenue is obtained at the same time. When one year ends, a new cycle begins and this process is repeated forever (assume the company will exist forever).

Currently, ITLV is the only company producing this product with the following cost structure and market demand:

TFC = 4,200
 TVC = 10Q²
 Demand: P = 4,200 - 50Q

As ITLV is getting ready to start a new production cycle with the above cost structure and market demand, a competitor with the same cost structure approaches with the following offer:

- ITLV can purchase the competitor at \$x today or
- ITLV has to share the market demand with the competitor. That is, ITVL will have the same cost structure but can sell only half of what it could sell at each price.

a) (15 points) If the interest rate is 10% per year, and ITLV chooses to buy the competitor today, what is the maximum \$x it should pay? (Assume costs and prices stay the same into the future and the default is for ITLV to produce and optimize its profit each year forever. That is, the companies do not get into a price war but maximize their own profit given their cost structure and their market demand.)

$$TC = 10Q^2 + 4200 \quad \pi = TR - TC = 2450(35) - [10Q^2 + 4200] = 69300$$

+ \$ 1 year

MC = 20Q

TR = [4200 - 50Q](Q)

MR = 4200 - 100Q

(+5) MR = MC → Q = 35

P = 4200 - 50(35) = 2450

Optimal Q and P

The price they purchase at should be such that the price pays for itself via perpetuity. If they share the market, they each make 61136.44. The difference is what ITLV loses out on and could invest to buy the company.

$P = \frac{A}{i}$

$P = \frac{x}{.1} = 8163.56$

$x = 816.36$

b) (7 points) Would the competitor accept the price you found in part a?

TC = 10Q² + 4200

MC = 20Q

TR = [4200 - 50($\frac{Q}{2}$)]($\frac{Q}{2}$)

MR = 2100 - 25Q

MR = MC → Q = 46.67

P = 4200 - 50(46.67) = 1866.67

π = TR - TC = 61136.44

No, because they can make more money by sharing the market

(+10)

Multiple Choice (5 points each)

gunk

3. You are about to start a company to sell laptop computer accessories. You paid \$4,000 to a market research company to identify the profile of your target customers. You are planning on using a family property which used to be rented for \$12,000/year, as your office. You will need an industrial designer and supplies and equipment. An industrial designer costs \$1,800/month and supplies and equipment will cost \$24,000/month. Ignoring discounting, what is the total cost that you should include in your NPV calculations for the first year?

12000/year 1800/month x 12 24000/month x 12

- A. 25,800
- B. 25,800
- C. 309,600
- D. 321,600
- E. 325,600
- F. 468,800

4. In a typical production process, specialization is represented by

- A. the intersection of MC and ATC curves
- B. upward sloping MC curve
- C. steep portion of the TFC
- D. flattening portion of TVC curve
- ~~E. the increasing portion of the u-shaped ATC curve~~

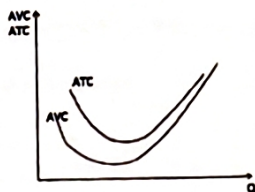
5. If price is equal to the minimum of ATC curve, then which of the following is not correct:

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- A. Firm does not make positive economic profit
- B. At the optimum production level, total revenue is equal to total cost
- C. Optimum production occurs at a quantity where ATC is minimum
- D. Since firm is making zero economic profit, the resources would bring higher returns at their alternative uses.
- E. At the optimum production level; price, marginal cost, and average total cost coincide.

6. The following curve depicting the average total cost and the average variable cost shows the two curves converging as output increases because

- ~~A. fixed costs are increasing.~~
- ~~B. variable costs increase at an increasing rate.~~
- C. average fixed cost is decreasing.
- ~~D. average fixed cost is constant.~~
- ~~E. variable costs increase at an increasing rate.~~

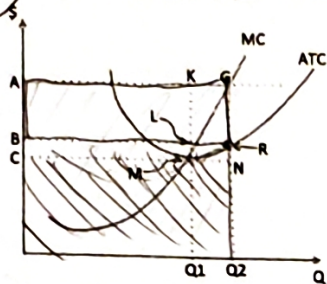


7. If a firm can reduce its ATC by switching to another scale, then we can be sure that

- A. currently firm is operating where ATC is decreasing.
- B. currently firm is operating where ATC is increasing.
- C. marginal cost must be flat.
- D. capacity has been reached.
- E. doubling the size will not double the costs.

8. If the firm pictured below faces a price shown at A, then the firm

- A. earns a profit equal to the area of AKLB
- B. earns a revenue equal to the area of ABRG
- C. earns a profit equal to ACNG
- D. incurs a total cost equal to the area of BCNR
- E. earns a profit equal to the area of ABRG



9. The following are true about advertising except

- A. It plays a more effective role in monopolistically competitive markets than in perfectly competitive markets
- B. It is used to reduce product differentiation
- C. It is used to make a firm's demand curve less price sensitive.
- D. It is used to increase a firm's market share.
- E. It is used to reduce consumer sensitivity to price changes.

-0

(25)

Determine whether each of the following statements TRUE or FALSE. In either case, briefly explain your reasoning. (4 points each)

10. TRUE/FALSE: Perfect Competition is not necessarily the best market structure for encouraging innovation. **False**, even though each company has small market share, if they innovate, differentiate, and advertise, consumers will have the incentive to switch to the innovating firm's product because it's now special which **more \$**.
11. TRUE/FALSE: The "short-run" in the life of a business is widely accepted as 2 to 3 years. **False**, it differs from industry to industry.
12. TRUE/FALSE: A business owner who continues to produce with zero economic profit is not making efficient use of the resources. **False**, since total cost includes opportunity cost, if they are making zero econ. profit, they are making as much as their next best alternative could make them **for their resources**.
13. TRUE/FALSE: Price customization software used on online trading is a form of price discrimination. **True**, the customization software allows a company to individually target customers willing to pay more for certain goods instead of simply offering a certain price to all customers.
14. TRUE/FALSE: Company A and B are competing in the same market. As A increases its advertisement spending, the demand for A's products will be more price sensitive and the demand for B's products will be less price sensitive. **False**, A's will be less price sensitive because ads will tell consumers how A's product is better making people want it more without caring for price as much. B's product will then be not as captivating and people will easily leave given a small price change.
15. TRUE/FALSE: Given fixed capital and equipment, labor efficiency increases continuously as the size of the labor force is increased. **False**, we have seen how ATC initially decreases due to specialization and then increases as capacity constraints are hit. Therefore, efficiency doesn't increase forever.
16. TRUE/FALSE: If Marginal Revenue is equal to Average Total Cost at the optimal production level, then we can be sure that firm is making zero economic profit. **False**, this is thinking in terms of averages if we only consider MR and ATC. If it was MR, MC and ATC then this would be true.