
Final Examination: 1/2017

Subject: EE 481 Industrial Economics

Date: December 14, 2017

Time: 9:00 - 12:00 hrs.

Part 1: Short answers (40 points)

1. (10 points) Suppose an invention of a self-driving car can bring the net social benefit equivalent to 50 billion baht. Suppose that each research lab needs a funding of 2 billion baht. The probability that at least 1 lab will invent a self-driving car $\rho(n)$ depends on the number of labs funded. This probability takes the form $\rho(n) = (1 - \exp^{-0.061n})$, where “n” represents the number of labs funded.

- a) If the government decides to give funding for self-driving car, what should be the optimal number of labs that receive government funding?
- b) If the government decides to give a prize to whoever can invent the self-driving car first, what should the value of the prize, given that there are 9 labs participating in this competition?

Given

n	$(1 - \exp^{-0.061n})$
2	0.1149
3	0.1672
4	0.2165
5	0.2629
6	0.3065
7	0.3475
8	0.3861
9	0.4225
10	0.4566
11	0.4888
12	0.5191

2. (10 points) Referring to our Garment example, suppose there are 3 companies. The first company needs to sew 100,000 buttons, the second company needs to sew 10,000 buttons, the third company needs to sew 1,000 buttons. Suppose buttons are sold in a competitive market at price = mc = 5 cents each. Suppose the labor cost of sewing 1 button is 1 cent each. If a sewing machine can replace labor, answer the following questions:

2.1 How much would each company be willing to pay for a sewing machine?

company 1: _____

company 2: _____

company 3: _____

2.2 Suppose the sewing machine monopoly can do requirement tie-in and sell buttons along with its machine, what should be the price of each sewing machine and the price of each button for the sewing machine monopoly to extract all the willingness to pay from each garment company?

2.3 If the cost of producing 1 sewing machine is 50 dollars, what should be the price of each sewing machine and the price of each button for the sewing machine monopoly to maximize its profit? How many companies will buy this machine?

Part 2: Problem Set (1 problem)

(40 points) Suppose the production of 1 tablet requires 1 battery. The marginal cost of 1 battery is 20. The tablet firm's own marginal cost of producing 1 tablet 100. The demand for tablet is given by:

$$P(Q) = 1000 - Q$$

Suppose the battery industry is perfectly competitive and the tablet industry is operated by a monopoly.

- (a) (5 points) Let the price per 1 battery " P_b ", find the derived demand for battery.
- (b) (5 points) According to the derived demand in part a), what would be the price of battery? What would be the quantity of battery sold in the market? Find the profit earned by a battery firm.
- (c) (5 points) What would be the price of a tablet? What would be the quantity of tablet sold in the market? Find the profit earned by the tablet monopoly.
- (d) (10 points) Suppose the battery industry is now consolidated into two identical firms (a duopoly), while the tablet industry has a new entrant (now a duopoly as well). All firms play a non-cooperative Cournot game. The marginal costs of both the battery and the tablet industry remain the same. Find the derived demand for battery faced by the battery duopoly.
- (e) (5 points) From the derived demand in part (d), what should be the price and quantity of battery set by the battery duopoly? Find the profit earned by each battery firm.
- (f) (5 points) Following from part (d) and (e), calculate the market price of tablets, the quantity of tablets produced by each tablet firm. Calculate the profit earned by each tablet firm.

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Part 3: Graph and Explanation (25 points) –Your answer should about 1-1.5 page long.

CHOOSE ONE of the below options

Option 1: "Minnie's favorite travel destination is "California". However, the cost of travelling to California is usually beyond her budget. As a result, Minnie usually chooses to travel to cheaper destinations like Japan or Hong Kong. Use a product differentiation model learned in class to illustrate Minnie's situation. Label all the important points on your graph.

Option 2: Phillip Zoom is a teeth-whitening technology. Zoom is sold to dental clinics as a bundle of two products. First, the Phillip Zoom treatment machine. Second, the Phillip Zoom whitening formula. While Phillip clearly has some market power over the machine, the whitening formula can be bought in the competitive market. However, the Phillip company chooses to sell the two products in a bundle anyway. Explain why the Phillip company has chosen to do this.



1) The Phillip Zoom treatment machine



2) The Phillip's whitening formula

Option chosen

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