

UBC

Managerial Economics: Commerce/ FRE 295

Mock Final Exam

Gotta catch 'em all!™

Part I: Multiple Choice

1. Supply and Demand: The demand of instant noodle in UBC is given by $Q_d = 10 - 2P_1 + 2P_j + 5Y$, where P_1 is the price of instant noodle, P_j is the price of juice and Y is income. Based on the equation, which statement is certainly **false**?
 - a. Instant noodle is a normal good.
 - b. Juice and instant noodle are complements.**
 - c. Juice is a normal good.
 - d. Both A and C
 - e. All of the above
2. Elasticity: The (inverse) demand curve of tea is given by $P = 40 - 2Q$. The market equilibrium is at $P = 16$. The demand is:
 - a. Elastic
 - b. Inelastic**
 - c. Unit elastic
 - d. Perfectly elastic
 - e. Perfectly inelastic
3. Regression: In a linear regression estimation, if over 80% of the data points do not fall on the regression line, then:
 - a. The data most likely do not reflect any useful trend.
 - b. Linear may not be the optimal choice of estimation.
 - c. There is too much uncertainty in the data.
 - d. We cannot come to a definitive conclusion regarding the data and estimation.**
 - e. There is potentially too much human error involved.
4. Consumer Choice: Annie spends all her income on chocolates and cupcakes, both of which display diminishing marginal return. Currently, Annie is willing to trade 3 pieces of chocolates for 4 cupcakes. Assuming Annie maximizes happiness and chocolate and cupcake are the only things that make her happy.
 - a. Annie currently maximizes her utility.
 - b. Annie should consume more chocolate and less cupcake.**

- c. Annie should consume more cupcake and less chocolate.
 - d. Annie should consume less of both.
 - e. Annie should consume however much chocolate she can afford and disregard her consumption of cupcake.
5. Production: Andrew sells cats. His business employs both labors and capitals in selling cats, with the production function given by $Q=L^3K$. 5 employees explained their view on expending the business, but only one is correct. Help Andrew in picking out the right statement.
- a. **"We should hire more people!"**
 - b. "The more equipment we buy, the less useful each additional unit of equipment is to us."
 - c. "Even if we expend all of our inputs by the same percentage, our production will grow by a lesser percentage."
 - d. "We should sell different cats to different people at different prices!"
 - e. "If we increase our price slightly, we can earn even higher revenue."
6. Cost: Half of Andrew's employees have gone on a strike. However, under the Labor Relations Code of BC, Andrew is not allowed to replace these workers with someone else. If wage rate is \$20/hour and capital rental rate is \$10/hour, which of the following production function allows Andrew to continue the same level of output at no additional cost?
- a. **$Q=3L+2K$**
 - b. $Q=2L+3K$
 - c. $Q=4L+10K$
 - d. $Q=L^3K$
 - e. $Q=2LK^{0.5}$
7. Profit Maximization: Ratna & Co. produces Pokémon supplies, which is a perfectly competitive market. The original (inverse) market demand is given by $P=88-3Q$. However, due to poor market conditions, the demand has declined sharply. If the cost function of Ratna & Co. is always $C=10+40Q+0.5Q^2$, how much does the demand have to drop to shut down its operation?
- a. >15
 - b. **>30.112**
 - c. >44.472
 - d. >50.327
 - e. The company already operates below shutdown point.
8. Perfect Competition: Which of the following is a perfectly competitive market?
- a. Jonathan is playing with Fred, and Fred doesn't want to play with Jonathan anymore. However, Jonathan locked all his doors and doesn't let Fred leave.
 - b. Bob wants to sell his U-pass, but he is caught by Jeff Chen.

- c. **Andrew sells cats, Annie sells dogs. Dogs and cats are homogeneous products.**
 - d. Jonathan has a lemonade stand. It is the only lemonade stand in his neighborhood.
 - e. Lisa sells her textbook at a price higher than her marginal cost.
9. Monopoly: Somehow Andrew gained monopoly over the cat market, where the demand is represented by $Q=10-P/3$, and Andrew has cost function given by $C=50+5Q+Q^2$, where Q is in thousands of cats, and P is in thousands of dollars. How much should Andrew charge per cat if he is to charge one price for everyone?
- a. \$3.13
 - b. \$5.00
 - c. \$15.00
 - d. \$20.63**
 - e. \$20,625.00

10. Integrated Question: Nathan is kidnapped by pirates. The pirates demand a \$800,000 ransom, or they will take Nathan's head. Nathan, being quick minded and wants to save his life, throws the following offer: if the pirates spare his life and set him free, they will receive \$1,000,000. However, the pirates know that there is only 50% chance that Nathan will keep his promise. The pirate spend a night drafting the following outcome table (the values are in hundred-thousand dollars, corresponding to the conditions above):

		Nathan	
		Pay	Don't pay
Pirates	Set free	X, -X	0, 0
	Don't set free	8, -8	0, $-\infty$

The pirates come back the next day to renegotiate the deal. The pirates have utility function $U=2W^2$, where W is their income. Out of the following possible offers, which one should Nathan pick so that he will be set free?

- a. Maintain the same offer as yesterday.
 - b. Offer to pay \$900,000, with a 10% chance of getting an additional \$100,000.
 - c. Offer to pay \$1,100,000.
 - d. Offer to pay \$1,200,000.**
 - e. Offer to either pay \$1,600,000 or nothing.
11. Price Discrimination: The cookie market is monopolized under government policies and has two kinds of consumers, with (inverse) demand schedules $P_1=50-4Q_1$ and $P_2=30-4Q_2$. The marginal cost of the producer is constantly

10. If the firm is required to charge equal consumption fee for everyone, how much should the membership fee be?

- a. \$10 for everyone
- b. \$25 for everyone**
- c. \$50 for everyone
- d. \$50 for group 1 and \$25 for group 2
- e. \$5 for group 1 and \$10 for group 2

12. Bundling: COMM295's textbook has a corresponding study guide. However, not all students value the book and study guide equally. Below are the three types of students:

	Textbook	Study Guide	Bundle
Student A	\$60	\$5	\$65
Student B	\$40	\$20	\$60
Student C	\$30	\$40	\$70

Assuming no cost, what is the profit maximizing strategy?

- a. Pure bundling strategy at \$60
- b. Pure bundling strategy at \$65
- c. Mixed bundling strategy with bundle price \$60, textbook price \$60 and study guide price \$40**
- d. Mixed bundling strategy with bundle price \$65, textbook and study guide price \$40
- e. Standalone pricing strategy at textbook price \$30 and study guide price \$40

13. Pricing: Andrew wishes to implement price discrimination strategy for his cat business. Which of the following will **not** hinder the success of his strategy?

- a. Buyers selling cats on eBay.
- b. Annie just opened another cat shop across the street.
- c. Consumers are shifting from buying cats to buying foxes.**
- d. Andrew is unsure what kind of customers he has.
- e. None of the above

14. Monopolistic Competition: For the purpose of this question, Andrew's cat business now operates in a monopolistically competitive market. The demand and cost are still the same as in question 9, given by $Q=10-P/3$ and $C=50+5Q+Q^2$, respectively. If his production and price levels are constant, his revenue in the long run is...

- a. \$0.00
- b. \$20,625.00
- c. \$46,875.00
- d. \$64,453.13**
- e. \$75,000.00

15. Game Theory: The following table represents all the possible outcomes in an duopoly:

	Samsung		
Apple		Sue	Don't sue
	Sue	-30, -30	70, 20
	Don't sue	20, 70	40, 40

Which statement is correct?

- a. The maximin strategy will yield the same outcome as in an infinitely repeated game.
- b. If the game is played 20 times, both firms will never sue.
- c. No firm has incentive to sue each other in the case of a sequential game.
- d. Both A and C**
- e. None of the above

16. Uncertainty: Bob is a risk lover. What could his utility function look like?

- a. $U=3W+9$
- b. $U=5W^{0.9}$
- c. $U=W/0.4$
- d. $U=W^2-0.24$**
- e. $U=0.5W^{0.3}$

17. Behavioral Economics: Fred is looking for a job. The first job offers him a base pay of \$5000, with 30% of chance of getting a \$5000 bonus that is randomly distributed. The second job offers him \$10000 base pay, but his pay has a 70% chance to be cut in half. Assuming Fred behaves like an average person who has never paid attention in econ classes, which one would he choose?

- a. First job**
- b. Second job
- c. He would be indifferent.
- d. We need to know his attitude towards risks in order to answer this question.
- e. None of the above

18. Asymmetric Information: UBC bookstore sells a set quantity of used textbooks, some of which are good and others are bad. Students are willing to pay \$70 for good books, and \$30 for bad ones, while the bookstore is willing to sell good ones for \$50 and bad ones for \$20. Buyers and sellers are risk neutral. If the students know about the proportion of good and bad books, but cannot tell them apart, which case does not present an adverse selection problem?

- a. Students are able to get textbooks elsewhere for lower prices.
- b. The bookstore uniformly price all used books at \$70.

- c. Students have a 60% chance of buying a bad book without knowing.
- d. At least 50% of the books are bad.
- e. **At most 50% of the books are bad.**

19. Market Failure: Amy and Jessie are sisters. Amy really wants a teddy bear and doesn't want a doll, and Jessie really wants a doll but doesn't want teddy bear. Their parents decide to wrap both in the exact same packaging for Christmas that only they can tell apart, and their daughters get whichever one they open. Which of the following statement is **false**?

- a. If Amy gets the doll and Jessie gets the teddy bear, there will be deadweight social loss.
- b. If their parents gives the teddy bear to Amy and doll to Jessie, it will be a Pareto improvement.
- c. This is a case of market failure.
- d. **If the sisters take turns opening the gifts, instead of at the same time, their expected outcomes will be slightly better off.**
- e. None of the above

20. Integrated Question: The U-pass market is, although illegal, a perfectly competitive market. The marginal private cost of U-pass is always \$30. Its perfect substitute, the 3-zone adult pass, costs \$170 at its regular price. The financial cost of being caught by Jeff Chen is \$300, though the chance of this happening is only 20%. The monthly (inverse) demand schedule of U-pass is given by $P=300-5Q$. Keeping the U-pass for yourself gives you 100 util. If your utility function is $U=(0.1W)^2-100$, where W is your profit, how much should you sell your U-pass for to maximize your utility?

- a. At $MR=MC$
- b. Just below \$170
- c. At your expected cost
- d. As much as you want
- e. **You shouldn't sell your U-pass**

Part II: Long Answer (Answer 4 out of the 5 questions)

1. Externality

In order to promote greener life style, the BC government has imposed a carbon tax of 30 cents for every liter of gas produced. The demand schedule for gas in BC is $Q=150-0.5P$, and the marginal cost of every liter of gas is given by $MC=150+Q$. The marginal externality cost is given by $MEC=100+2Q$.

a) Determine the equilibrium price and quantity of gas, assuming the industry to be perfectly competitive. (3pt)

Answer:

Demand: $Q=150-0.5P \rightarrow P= 300-2Q$

Supply= $MC=150+Q$

$$\text{Supply}=\text{Demand} \rightarrow 300-2Q=150+Q \rightarrow Q=50 \text{ liters, } P=200 \text{ cents}=\$2$$

b) Does the carbon tax completely eliminate the deadweight social loss? How much does it eliminate? (6pt)

Answer:

$$\text{MSC}=\text{MEC}+\text{MC}=(100+2Q)+(150+Q)=250+3Q$$

$$\text{MSC}=\text{Demand} \rightarrow 250+3Q=300-2Q \rightarrow Q=10 \text{ liters, } P=280 \text{ cents}=\$2.80$$

$$\text{Equilibrium with tax: Supply}+\text{tax}=\text{Demand} \rightarrow 150+Q+30=300-2Q \rightarrow$$

$$Q=40, P=220 \text{ cents}=\$2.20$$

$40 > 10$ & $220 < 280$, therefore the tax doesn't completely eliminate the DWL.

Plug in the equilibrium quantity from part a to MSC $\rightarrow P=400$

$$\text{Original DWL: } (400-200) \cdot (50-10) \div 2 = 4000$$

Plug in the equilibrium quantity with tax to MSC $\rightarrow P=370$

$$\text{New DWL: } (370-220) \cdot (40-10) \div 2 = 2250$$

$$\text{The tax eliminated } 4000-2250=1750 \text{ DWL}$$

c) Draw a diagram that reflects the effects of carbon tax. Make sure to include situations before and after the tax is implemented. (6pt)

Answer:

Diagram should include:

Supply and Demand (2pt)

MSC (1pt)

Original and after-tax DWL (2pt)

Equilibrium after tax (2pt)

2. Market Power

Andrew wishes to purchase all used textbooks from students, thus establishing a monopoly business of used textbooks. Currently the market demand of used books is given by $P=300-2Q$, and the supply curve of this perfectly competitive market is perfectly inelastic, at $Q=150$.

a) Assuming that Andrew has to first purchase books at the current market price. How much does he have to spend for his scheme to work? (1pt)

Answer:

$$P=300-2Q=150 \rightarrow P=\$75$$

$$P \cdot Q=75 \cdot 150=\$11,125$$

b) The demand of used books remains unchanged after Andrew's monopolization. Assuming Andrew has no marginal cost and wants to maximize profit with a uniformed price. How much should he sell, for how much, and what's his profit? If he maintains this level of profit, what is likely to happen to the market in the long run? (4pt)

Answer:

$$MR=300-4Q$$

$$MC=MR \rightarrow 300-4Q=0 \rightarrow Q=75$$

$$P=300-2 \cdot 75=\$150$$

$$\pi=R-C=75 \cdot 150-11,125=\$0$$

Since Andrew makes 0 profit, no one will enter or exit the market in the long run.

c) The UBC bookstore sells new books for \$200. Half the students prefer new books and will buy them at this price, but they will buy used books if it's offered at a decently cheap price. Specifically, their demand for used books is $P_2=100-4Q_2$. If Andrew is able to charge a non-uniform membership fee for those who purchase his textbooks, how much should he charge? After that, how much should he charge per textbook? How much would his profit change from part b? (10pt)

Answer:

$$P=MC=0$$

$$400-2Q_1=0 \rightarrow Q_1=100$$

$$100-4Q_2=0 \rightarrow Q_2=25$$

$$CS_1=400 \cdot 100 \div 2=20,000$$

$$CS_2=100 \cdot 25 \div 2=1,250$$

Andrew should charge \$20,000 entry fee for the first half of the students, and \$1,250 for those who would buy new books. This way, his new profit is \$21,250, which \$1,0125 more than part b.

3. Game Theory

The videogame console market is a duopoly consisted of two almost-identical firms, Sony and Macrosoft. The table below illustrates possible pricing strategies of each firm and their potential outcomes:

	Macrosoft		
Sony		\$399	\$499
	\$399	50, 50	70, 30
	\$599	30, 70	40, 60

a) What are their respective dominant strategies? And what is the Nash Equilibrium? (3pt)

Answer:

Sony: \$399; Macrosoft: \$399

Nash Equilibrium: 40, 60

b) Prior to revealing their pricing strategies, Sony somehow tricked Macrosoft to choosing \$499 with the following disguise to their outcomes:

	Microsoft		
Sony		\$399	\$499
	\$399	50+X, 50	70, 30
	\$599	30, 70	40, 60+Y

What is the value of X? (2pt)

Answer:

$$50+X < 30 \rightarrow X < -20$$

$$60+Y > 70 \rightarrow Y > 10$$

c) A third company, Nintendog, attempts to (re)enter the market. To avoid its entrance, Sony and Macrosoft forms a temporary alliance against Nintendog. They can spend extra money on marketing so that entry for Nintendog is not longer rational. If it does entre, however, Sony and Macrosoft can still choose to wage a price war, or just accommodate in case of an entry (without the extra investment in marketing).

	Sony & Macrosoft		
Nintendog		Accommodate	Price war
	Entre	40, 60	-10, 40
	Don't entre	0, 100	0, 100

Assuming the marketing investment shrinks the combined benefit of Sony & Macrosoft by 10, draw a tree-diagram of the sequential game. Then, highlight the Stackelberg outcome. (10pt)

Answer:

Entre \rightarrow X, 50 (X<0)

Invest \rightarrow Nintendog {

Don't entre \rightarrow 0, 90 (Stackelberg outcome)

\$&M{

Entre \rightarrow 40, 60

Don't invest \rightarrow Nintendog {

Don't entre \rightarrow 0, 100

4. Asymmetric Information

Annie opens a pet shop and hires Jonathan as her manager, so that she can spend her time playing Candy Crush. The market has constant (inverse) demand schedule of $P=30-2Q$. The shop has supply function given by $C=X+3Q$, where X is a variable that depends on Jonathan's effort and luck, which are in turn given by the following table:

	Bad Luck (50%)	Good Luck (50%)	Cost of Effort
Low Effort	50	25	0
Medium Effort	30	15	3
High Effort	10	5	5

The supply function does not include Jonathan's pay.

Annie has the option to give Jonathan one of the following pays: \$10 fixed pay, 30% profit share, or 40% of the revenue above \$40. How should Annie play him to maximize her profit? (15pt)

Answer:

Equating demand and supply, we obtain $Q=6-X/5$, and hence the following table:

Quantity=	Bad Luck (50%)	Good Luck (50%)
Low Effort	-4	1
Medium Effort	0	3
High Effort	4	5

Subsequently, we obtain the price at each supply level, the firm's revenue and profit:

Price=	Bad Luck (50%)	Good Luck (50%)
Low Effort	n/a	\$28
Medium Effort	\$30	\$24
High Effort	\$22	\$20

Revenue=	Bad Luck (50%)	Good Luck (50%)
Low Effort	n/a	\$28
Medium Effort	\$0	\$72
High Effort	\$88	\$100

Profit=	Bad Luck (50%)	Good Luck (50%)
Low Effort	n/a	\$2
Medium Effort	\$0	\$14
High Effort	\$24	\$38

For fixed pay, Jonathan will put in minimum effort to maximize his own payoff. For the other two, Jonathan's payoffs are given below:

30% share:	Bad Luck (50%)	Good Luck (50%)	Cost of Effort
Low Effort	0	0.6	0
Medium Effort	-3	1.2	3
High Effort	2.2	6.4	5

40% revenue share over \$40	Bad Luck (50%)	Good Luck (50%)	Cost of Effort
Low Effort	0	0	0
Medium Effort	0	9.8	3
High Effort	14.2	19	5

On the other hand, Annie's profit after paying Jonathan is given as:

Fixed:	Bad Luck (50%)	Good Luck (50%)
Low Effort	-\$10	-\$8
Medium Effort	-\$10	\$4
High Effort	\$14	\$28

30% share:	Bad Luck (50%)	Good Luck (50%)
Low Effort	\$0	\$0.14
Medium Effort	\$0	\$9.8
High Effort	\$16.8	\$26.6

40% revenue share over \$40:	Bad Luck (50%)	Good Luck (50%)
Low Effort	\$0	\$2
Medium Effort	\$0	\$1.2
High Effort	\$4.8	\$14

Annie's profit is maximized when Jonathan exerts high effort and she pays him 30% profit share. From Jonathan's revenue tables, we can see that he is motivated to exert maximum effort under 30% profit share. Hence, Annie should pay him 30% profit share.

5. Uncertainty

Jon is enrolled in COMM 292. His final grade depends on two variables: the amount of effort he puts in, and his luck, as shown in the table below:

	Bad Luck (50%)	Good Luck (50%)	Cost of Effort
Low Effort	0	60	0
Medium Effort	70	95	10
High Effort	90	100	25

a) Jon's utility function is $U=G^{0.7}-2C$, where G is his grade and C is his cost of effort. Assuming Jon is rational and always maximizes his utility, based on these information, would you say Jon is a try-hard (always works hard), average student (puts in medium effort), or a slacker (doesn't work hard at all)? (4pt)

Answer:

Low effort: $U=50\% \cdot 0^{0.7} + 50\% \cdot 60^{0.7} - 2 \cdot 0 = 8.78$

Mid effort: $U=50\% \cdot 70^{0.7} + 50\% \cdot 95^{0.7} - 2 \cdot 10 = 1.90$

High effort: $U=50\% \cdot 90^{0.7} + 50\% \cdot 100^{0.7} - 2 \cdot 25 = -3.33$

Because Low > Mid > High, therefore Jon prefers low effort. Thus he is a slacker.

b) Research shows that the more effort one puts in, the better luck he or she gets. While bad luck and good luck at low effort both remain at 50%, at medium effort

and high effort they are now respectively 40%/60% and 20%/80%, respectively. How does this change your evaluation of Jon? (4pt)

Answer:

Low effort: $U=50\% \cdot 0^{0.7} + 50\% \cdot 60^{0.7} - 2 \cdot 0 = 8.78$

Mid effort: $U=40\% \cdot 70^{0.7} + 60\% \cdot 95^{0.7} - 2 \cdot 10 = 2.37$

High effort: $U=30\% \cdot 90^{0.7} + 70\% \cdot 100^{0.7} - 2 \cdot 25 = 6.00$

Because Low > High > Mid, therefore Jon prefers low effort. Thus he is still a slacker.

c) Ratna really wishes to encourage Jon to work hard. He tells Jon that he would give him a final grade of X for sure if Jon is will to put in high effort. What is the minimum value of X for this offer to work? What is Jon's risk premium? (Assuming the utilities from part b.) (7pt)

Answer:

Low effort: $U=50\% \cdot 0^{0.7} + 50\% \cdot 60^{0.7} - 2 \cdot 0 = 8.78$

Mid effort: $U=40\% \cdot 70^{0.7} + 60\% \cdot 95^{0.7} - 2 \cdot 10 = 2.37$

High effort: $U=30\% \cdot 90^{0.7} + 70\% \cdot 100^{0.7} - 2 \cdot 25 = 6.00$

Because Low > High > Mid, therefore Jon prefers low effort. Thus he is still a slacker.

Substitute the maximum utility (low effort) into the original utility function, with the effort cost of high effort:

$U=G^{0.7} - 2C = G^{0.7} - 2 \cdot 25 = 8.78$

Then solve for G.

$G=336.91$

Risk Premium=EV of Low Effort-G=30-336.91=-306.91%