

UBC

Commerce/ FRE 295

FINAL EXAM ANSWERS

December 14, 2009

Multiple Choice _____ / 40

Long Answers: 1. _____ / 15 (answer 4 out of 5)
2. _____ / 15
3. _____ / 15
4. _____ / 15
5. _____ / 15

TOTAL _____ / 100

PART I
MULTIPLE CHOICE QUESTIONS

Each question has one correct response. Please circle the letter in front of the correct response for each question. There are 20 questions. Each question is worth 2 pts.

1. You are in charge of raising \$10 million in new taxes for the government. You need to select one market to tax out of a wide range of possibilities. You want to minimize consumer anger and so you would like the share of the tax that consumers bear to be as small as possible.

- a) You should look for a market with relatively inelastic demand and relatively elastic supply.
- b) You should look for a market with relatively elastic demand and inelastic supply. T**
- c) Your choice of market does not matter because all taxes are ultimately passed through to consumers.
- d) None of the above.

2. You run a bike shop. You recently raised the price of a particular kind of bicycle by a small amount. You discovered that your revenues increased and your costs decreased. Assume that the demand curve for these bicycles is linear.

- a) At the initial price, demand was elastic.
- b) If your goal is to increase profits, you should lower the price below the initial price.
- c) At the initial price marginal revenue was negative. T**
- d) If you continue to raise the price, the demand elasticity will eventually approach zero.

3. TJ likes both watermelon and mangos. She is trying to decide how many of each to buy. If she spent all her money on mangos, she could afford 10 mangos. The ratio of the price of mangos (p_M) to the price of watermelon (p_W) is $p_M/p_W=1/2$ (i.e. a watermelon costs twice as much as a mango). Which of the following bundles will TJ definitely NOT purchase:

- a) 6 mangos, 3 watermelon. T**
- b) 8 mangos, 1 watermelon.
- c) 0 mangos, 5 watermelon.
- d) All three choices are possible; there is not enough information to answer the question.

4. Hassan likes to go to soccer games (S) and music concerts (C) and has utility function $U=S+C$. Given current prices, he maximizes utility by only going to soccer games (no concerts). If the price of soccer games drops and the price of concerts stays the same, he will:

- a) Go to many more soccer games and a few additional concerts.
- b) Go to more soccer games, and no concerts. T**
- c) Go to equal numbers of soccer games and concerts
- d) All three choices are possible; there is not enough information to answer the question.

5. Consider a production function (in the long run) with inputs labour (L) and capital (K). If the marginal product of labour is always increasing, which of the following must be true?

- a) The marginal product of capital is always decreasing.
- b) The production function has constant returns to scale.
- c) The production function has decreasing returns to scale.
- d) None of the above. T**

6. A firm has a cost function given by $C = 9 + 2Q + Q^2$.

- a) The firm has positive fixed costs.
- b) The marginal cost curve cuts the average cost curve at $Q = 3$.
- c) The minimum average cost is 8.
- d) All of the above. T**

7. Which statement about the organization of firms is correct.

- a) The non-profit sector consists of all firms that fail to make positive profits.
- b) An important feature of corporations is limited liability.
- c) The separation of ownership and control in corporations often leads to agency problems.
- d) Both (b) and (c) are correct. T**

8. The paper industry is in a long-run equilibrium under perfect competition. Firms have U-shaped average cost curves but the industry supply curve is horizontal (i.e. perfectly elastic). Suppose the demand for paper decreases. What will happen in the paper industry in the long run in response to this shift in demand?

- a) The quantity produced by each firm will not change but the number of firms will decrease. T.**
- b) Price, quantity, and the number of firms will stay the same as before.
- c) Price, total quantity produced, and the number of firms will all decrease.
- d) None of the above.

9. Bill and Ted both have linear demand curves and each of them consumes 20 chocolate bars at the current market price. If Bill's demand curve is more elastic than Ted's demand curve, then

- a) Ted's consumer surplus is greater than Bill's.
- b) Bill's willingness to pay for his last chocolate bar is greater than Ted's.
- c) Both Ted and Bill are willing to pay the same price for the last chocolate bar each consumes.
- d) Both (a) and (c) are correct. T**

10. Consider a monopoly facing a downward-sloping demand curve that is selling output at a single (uniform) price. Which of the following statements is true?

- a) **The profit-maximizing price charged by the monopoly must exceed marginal revenue. T**
- b) A monopoly maximizes profits according to the formula: $(P - MC)/MC = -1/E$ where P is price, MC is marginal cost and E is the demand elasticity.
- c) If the government forces a monopoly to set price equal to marginal cost instead of maximizing profit, the loss in surplus for the monopoly will exceed the gain in consumer surplus.
- d) None of the above

11. A profit maximizing monopoly produces products X and Y at zero marginal cost. Suppose all consumers have a reservation price for X equal to R_X and a reservation price for Y equal to R_Y , where $R_X > R_Y$. These are the maximum prices a consumer would pay for each product and are known by the monopoly.

- a) Under individual (stand-alone) pricing the monopoly would set the price for each product equal to $(R_X + R_Y)/2$.
- b) The monopoly can earn higher profits with pure bundling than with individual stand-alone prices.
- c) If two-part tariffs are possible, the monopoly would not use stand-alone individual prices.
- d) **If the monopoly charges less than R_X and R_Y for X and Y respectively, it can extract all surplus from consumers with an access or entry fee for the right to buy these products. T**

12. For this question recall the Cournot, Bertrand and Stackelberg oligopoly models and determine which statement is true.

- a) All three oligopoly models predict prices that differ from perfect competition when the products are homogeneous.
- b) In the Stackelberg quantity-setting model the leader takes into account the follower's Bertrand reaction function (or best-response function).
- c) **With linear demand and homogeneous products, the Stackelberg model implies a larger output than the Cournot duopoly model. T**
- d) In the Bertrand model one of the firms has the opportunity to move first.

13. When we say that a cartel "fails" we mean that it is not able to maintain a collusive agreement. Which of the following statements about cartels is correct?

- a) Cartels do not fail on their own. They fail only because of legal restrictions.
- b) **A cartel might fail because one or more cartel members can increase profit by violating the cartel agreement. T**
- c) If a cartel member cheats that firm will normally be able to establish a natural monopoly.
- d) Using barriers to entry will normally cause a cartel to fail.

14. Which statement about monopolistic competition is correct?

- a) **A monopolistically competitive firm produces in the region of economies of scale. T**
- b) Each firm makes positive above-normal profits in the long run equilibrium.
- c) Monopolistic competition is a special case of competitive markets so every firm sets price equal to marginal cost.
- d) Under monopolistic competition each firm's marginal revenue curve is tangent to the average cost curve.

15. There are two firms, A and B, in the market for soft drinks. Each firm can choose either "High Advertising" or "Low Advertising". The payoffs are given in the following matrix where the first amount is the payoff for Firm A and the second is the payoff for Firm B. Firms choose simultaneously.

		Firm B	
		High Advertising	Low Advertising
Firm A	High Advertising	6, 6	12, 4
	Low Advertising	4, 12	10, 10

- (a) This is an example of a prisoner's dilemma game.
- (b) If the game is played only once, the maximin solution and Nash equilibrium are the same.
- (c) If this game is repeated indefinitely low advertising by both firms is a possible Nash equilibrium outcome.
- (d) All of the above. T**

16. Lisa is risk averse. She is offered a job that pays \$100 per day with probability 0.5 and \$400 per day with probability 0.5. Lisa is indifferent between this job and a job that pays \$225 for sure.

- a) Lisa's risk premium exceeds 20. T**
- b) Lisa's risk premium is less than 20.
- c) Lisa's risk premium equals 20.
- d) Lisa's risk premium cannot be determined from the above information.

17. A manager must choose one of four advertising strategies, with the following characteristics. The manager cares only about expected value and variance.

Strategy	Return with Bad Luck	Return with Good Luck	Probability of Bad Luck	Probability of Good Luck
A	2	8	0.6	0.4
B	5	5	0.3	0.7
C	1	5	0.1	0.9
D	0	12	0.5	0.5

- a) A risk neutral manager would necessarily prefer strategy C.
- b) A risk averse manager would necessarily prefer strategy B.
- c) A risk seeking manager would necessarily prefer strategy D. T**
- d) Any of these strategies might be chosen by a risk averse manager.

18. Which of the following is an example of a market failure?

- a) Once Joe buys fire insurance for his home, he will have reduced incentives to take preventive action to reduce the risk of fire.
- b) Drivers of cars on congested streets fail to take account of the costs they impose on other drivers in their driving decisions.
- c) A taxi company purchases from an airport the exclusive right to serve that airport, preventing other taxi companies from competing for rides leaving the airport.
- d) All of the above.**

19. Which of the following statements CANNOT be explained by standard expected utility theory, but can be explained by prospect theory.

- a) A loss of \$100 could lower an individual's utility more than a gain of \$100 increases utility.
- b) Shifting an individual's reference point for decision-making by framing a choice differently can induce that individual to change from a risk-averse choice to a risk-seeking choice. T**
- c) Shifting an individual's reference point for decision-making by framing a choice differently can induce that individual to make a risk-seeking choice over potential gains.
- d) All of the above.

20. Which of the following statements about oligopoly and game theory is correct.

- a) The Bertrand equilibrium and the Cournot equilibrium are different so they cannot both be Nash equilibria.
- b) The Bertrand equilibrium is a Nash equilibrium in prices. T**
- c) The Bertrand equilibrium is a Nash equilibrium and must therefore be a dominant strategy solution.
- d) The Cournot equilibrium is also the maximin solution.

PART II
LONG ANSWER QUESTIONS

Please answer four of the following five questions. Each question is worth 15 points. Show your working clearly in the space provided.

1. **Pricing.** The only local ski resort operates on just Wednesdays and Sundays. On Wednesdays demand is given by $Q_W = 1000 - 20P$ and on Sunday demand is $Q_S = 1500 - 10P$, where Q_i is the number of visitors for the day and P is the daily admission price. For safety reasons, the resort is only allowed to admit a maximum of 800 visitors per day. (Excess visitors are turned away without paying). The marginal cost of operating the ski resort is zero.

a) If the resort can charge different prices on Wednesday and Sunday and wants to maximize profits, what prices would it charge and how many skiers would be admitted each day? (6 points) (Hint: Don't forget to work with the inverse demand functions – with P on the left hand side.)

Wednesday: Inverse demand is $P = 50 - (1/20)Q$ for Wednesday.

$MR = 50 - (1/10)Q$ (1 pt).

The monopolist maximizes profits by setting marginal revenue equal to marginal cost.

Since $MC = 0$, this gives $50 - (1/10)Q = 0 \rightarrow Q^* = 500$ (1 pt).

Substitute this into the demand schedule to get price $P^* = 50 - 500/20 = 25$ (1 pt)

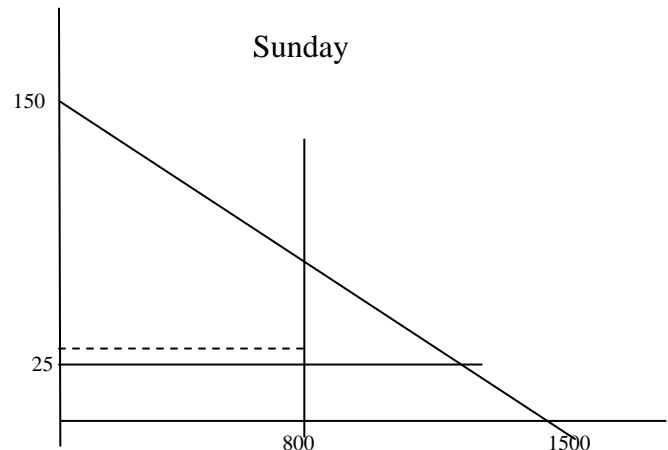
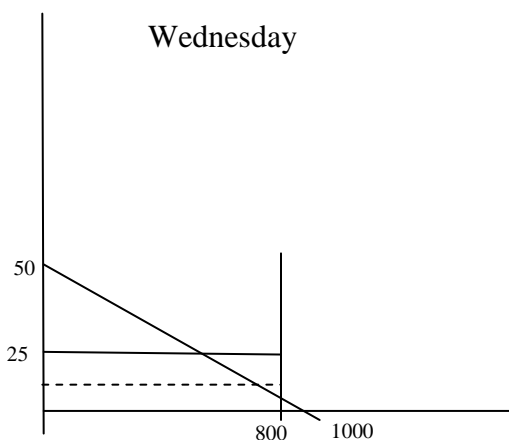
Sunday: $P = 150 - (1/10)Q$

$MR = 150 - (1/5)Q$ (1 pt)

Setting $MR = MC = 0$ yields $Q^* = 750$. (1 pt)

$P^* = 150 - 750/10 = 75$. (1 pt)

b) Now suppose that a local ski club takes over the resort and initially sets a daily admission price of \$25 for both Wednesday and Sunday. However, the club would prefer to maximize total surplus which, in this case, is the sum of consumer surplus and revenue. Label the graphs below and use them to demonstrate that adopting peak-load pricing – lowering the Wednesday price below \$25 and increasing the Sunday price above \$25 – will raise the sum of consumer surplus and revenue. Explain briefly but no actual calculations are necessary. (5 pts)



Output does not change on Sunday. Therefore total surplus does not change in the Sunday market. All that happens is that surplus is shifted from consumers to producers.

On Wednesday when price falls we can see that total surplus rises. It should be shown in the diagram that deadweight loss falls (or total surplus rises).

c) A profit-maximizing ski resort, as in part (a), and a ski club that seeks to maximize total surplus, as in part (b) would both want higher prices on Sunday than on Wednesday. However, part (a) shows that the profit-maximizing ski resort would not reach the maximum allowable capacity of 800. Assuming costs are zero, would the ski club reach this capacity limit? Explain in 100 words or less. (4 pts)

If they point out that capacity is reached on both days. As $MC = 0$ while $MB > 0$ we therefore want to raise output as much as possible (up to capacity). These points should be explained a bit more fully.

2. Oligopoly and Game Theory. Firm A is the only incumbent producer of skate boards in Vancouver and it faces market demand given by $P = 120 - Q$. The marginal cost (MC) of Firm A is constant at \$20. Firm B, with $MC = \$40$, is considering entering the market. If Firm B enters, Firm A will act as a Stackelberg leader. That is, Firm A will make its quantity decision first and will anticipate Firm B's reaction (best response) function is given by $Q_B = 40 - 0.5Q_A$.

(a) Find the Stackelberg equilibrium quantities of both firms and the price. (5 pts)

Demand: $P = 120 - Q$

Leader:

$$\begin{aligned} R_A &= PQ_A = (120 - Q_A - Q_B) Q_A \\ &= (120 - Q_A - (40 - 0.5Q_A)) Q_A \end{aligned}$$

$$MR_A = 80 - Q_A$$

$$\text{Set } MR_A = MC_A$$

$$80 - Q_A = 20$$

$$Q_A = 60$$

(It is okay to just maximize profit, setting $d\pi/dQ_A = 0$ instead of $MR = MC$.)

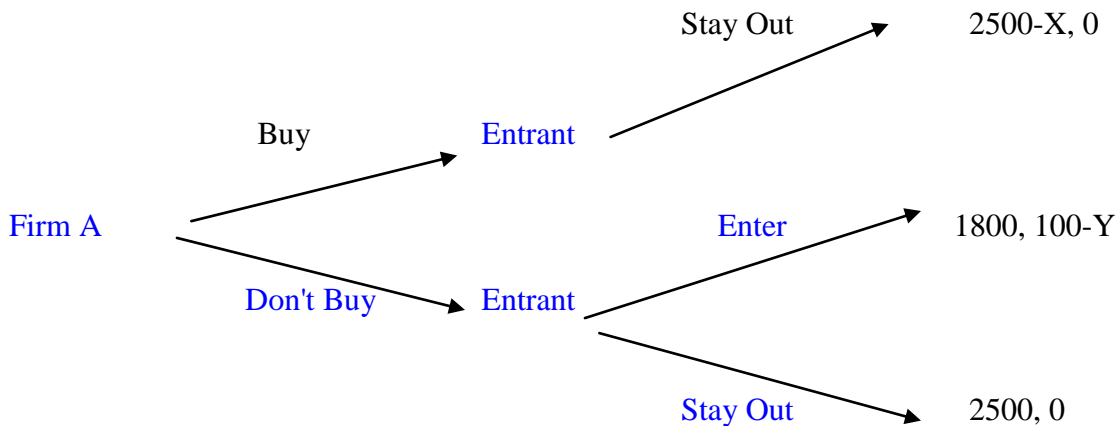
From Firm B's Reaction function,

$$Q_B = 40 - 0.5Q_A = 40 - 0.5*60 = 10$$

From demand function, $P = 120 - 70 = \$50$

b) Now suppose that the incumbent, Firm A, can buy an exclusive right to be the only firm in the market by paying a fee equal to X. If Firm A buys this right it monopolizes the market and earns profits equal to $\$2500 - X$. If Firm A does not buy this monopoly right, Firm B may or may not enter. If Firm B enters it must pay an entry fee equal to Y, in which case it makes profits equal to $100 - Y$ and Firm A makes \$1,800. If Firm B does not enter it makes \$0 while Firm A monopolizes the market and makes \$2500. Draw a game tree (i.e. an extensive form or

sequential form) diagram and find the ranges of values of X and Y for which Firm A will choose to buy the exclusive right. (6 pts)



As long as $X \leq \$700$ (1 pt) and $Y < 100$ (2 pt), Firm A will buy the exclusive right. Otherwise, it will choose not to buy the right.

Explanation: If $Y > 100$, then Entrant will stay out for sure and make 0 profits instead of entering the market and making negative profits. In this case Firm A will not buy the exclusive right, irrespective of the value of X. Therefore we require $Y < 100$ for Firm A to be willing to buy the exclusive right. If $Y < 100$ and Firm A doesn't buy the right, then Entrant will enter. Consequently, Firm A makes \$1800. However by buying the right, Firm A can make $2500 - X$. To buy the right it must be the case that $2500 - X > 1800$ or $X < 700$.

(c) Firm A can earn more profit as a Stackelberg leader in a quantity-setting sequential duopoly game than in a Cournot duopoly game. Explain in words why Firm A does better as a leader and cannot achieve the same thing in a simultaneous move (Cournot) game. Use the term “credible” in your answer. Explain in 100 words or less. (4 pts)

There will be many different answers.

One key point is that a Stackelberg leader gets to move first so its output choice is “credible”. The reason it is credible is that it produces the output before the follower produces output. Because the leader is able to move first it produces a larger quantity than it would in a Cournot model and earn a larger share of the profits. In the simultaneous move game it is not credible for Firm A to threaten to produce this output as it is not in Firm A’s interest to actually produce this output given what it should expect from Firm B.

3. Adverse Selection. There are two types of online ticket brokers operating on an eBay-like auction site: there are 50 type A brokers and 50 type B brokers. The probability that type A actually delivers a ticket to the buyer in time for the show is 90%, the probability that a type B brokers delivers the ticket on time is 70%. The minimum price the seller would accept from the buyer is \$85 for type A sellers and \$50 for type B sellers. Consumers (ticket-buyers) are risk neutral and value a ticket delivered on time at \$100 and a ticket that is not delivered on time at

\$0. Consumers know the probability of successful delivery for each type and the number of each type of seller, but can't determine whether a given seller is type A or type B.

a) Assuming sellers take no action to address this informational asymmetry, what will happen in this market if it exhibits adverse selection? Specifically, what price or prices would we observe in equilibrium? Explain your reasoning briefly. (5 pts)

The equilibrium price is \$70.

The logic is as follows. Buyers are risk neutral and will pay the expected value. The expected value of a ticket from a type A seller is $\$100 \cdot .9 + \$0 \cdot .1 = \$90$ and from a type B seller is $\$100 \cdot .7 + \$0 \cdot .3 = \$70$.

However, the buyers can't distinguish the two types of sellers, and thus the probability that a given ticket is from each seller is 50%. Therefore, the buyer will pay the expected value of a ticket that could be from each seller with equal probability: $.5 \cdot \$70 + .5 \cdot \$90 = \$80$.

However, this price is less than the reservation price of type A sellers ($\$80 < \85) and thus type A sellers will not participate in the market. Since the buyer can anticipate this, it knows that only type B sellers will remain and would only be willing to pay \$70 for a ticket.

b) Now suppose the auction site decides to put a star on the online profile of every type A seller, no star on the profiles of type B sellers, and the consumers know this. What price or prices would we observe in equilibrium now? Explain your reasoning briefly. (5 pts)

The buyers can perfectly distinguish between the two types using the starred profiles. Therefore the buyer pays the expected value for each type: $\$100 \cdot .9 + \$0 \cdot .1 = \$90$ to type A sellers and $\$100 \cdot .7 + \$0 \cdot .3 = \$70$ to type B sellers.

c) The auction site now changes its policy. Rather than giving stars to type A sellers and not to type B sellers, it now sells the stars to any ticket broker that is willing to pay \$1 for the star. This policy change is made in a public announcement so all consumers are aware of the change in policy. Will the adverse selection problem re-emerge? Explain in 150 words or less. (5 pts)

Yes, the adverse selection problem would re-emerge. The problem arises because, initially, type B sellers would have an incentive to buy the stars. Buyers would soon realize that the stars did not mean anything as both types of brokers would have them. The informational asymmetry would be restored – buyers cannot distinguish between the two types of sellers so would pay the same for both leading to adverse selection as the resulting price would not be high enough to keep type A sellers in the market.

4. Agency and Moral Hazard. Ace manages a small clothing store for an absentee owner. The following matrix shows how the net income of the store depends on Ace's effort and on luck. Each cell shows the net income, I, to the firm (without subtracting the manager's cost of effort).

	Bad Luck	Good Luck
Low Effort	20	60
Med. Effort	60	100
High Effort	100	160

Good luck and bad luck are each equally likely and have a probability of 0.5. Both Ace and the store owner are risk-neutral. Ace incurs a cost of effort of 0 for low effort, 10 for medium effort, and 32 for high effort. The owner cannot observe how much effort Ace puts in. Do the following questions, showing your working and explaining briefly.

a) If the owner offers Ace a fixed wage of 20, how much effort does Ace put in and what is the expected value for both the manager and the owner? (4 pts)

Ace puts in low effort.

The reason is that Ace gets a wage of 20 no matter what happens to the firm. Therefore Ace's return is 20 minus the cost of effort.

Under low effort Ace gets $20 - 0 = 20$. Under medium effort Ace gets $20 - 10 = 10$ and under high effort Ace gets $20 - 32 = -12$.

The owner gets $40 - 20 = 20$.

b) Now suppose Ace receives 40% of the net income instead of a fixed wage. How much effort does Ace put in and what is the expected value for both Ace and the owner? (6 pts)

Under low effort Ace gets 40% of the firm's expected return of 40, which is 16, and has no cost of effort so his net return is 16.

Under medium effort Ace gets 40% of the expected return of 80, which is 32, and subtracts the effort cost of 10 so his net return is $32 - 10 = 22$.

Under high effort Ace gets 40% of the firm's expected return of 130 which is 52 and subtracts the effort cost of 32 so his net return is $52 - 32 = 20$.

The best Ace can do is to provide medium effort and get 22. The owner gets 60% of the expected value under medium effort, which is $(0.6)(80) = 48$.

c) Would the owner want to give Ace a higher percentage return than 40% of net income? Explain briefly. (Hint: consider what happens if the owner offers 50%.) (5 pts)

If the owner gives Ace 50% of the net returns, Ace's net return under the different effort levels is as follows.

Low effort: $(0.5)(40) - 0 = 20$

Medium effort: $(0.5)(80) - 10 = 30$

High effort: $(0.5)(130) - 32 = 33$.

Therefore Ace would choose high effort and the owner would get $(0.5)(130) = 65$.

The owner does better under this system than when Ace gets 40%. Therefore the owner would prefer to give Ace a higher percentage return than 40%.

5. Externalities. Paper production is a competitive industry that generates negative externalities in the form of pollution discharged into the environment. The inverse demand for paper is $p=100-2Q$, where Q is a number of tons of paper per day. The industry inverse supply

curve is given by $p = 40 + 0.5Q$. The marginal external cost caused by pollution is given by $MC^E = 0.5Q$.

a. What is the industry's private marginal cost (MC^P) of paper production and what is the social marginal cost (MC^S). No diagram is needed but show your working. (You are asked for a diagram in part (c).) (5 pts).

The private marginal cost of steel production is $MC^P=40+0.5Q$ (2 pts) as the supply curve is the marginal cost curve (1 pt) over the relevant range.

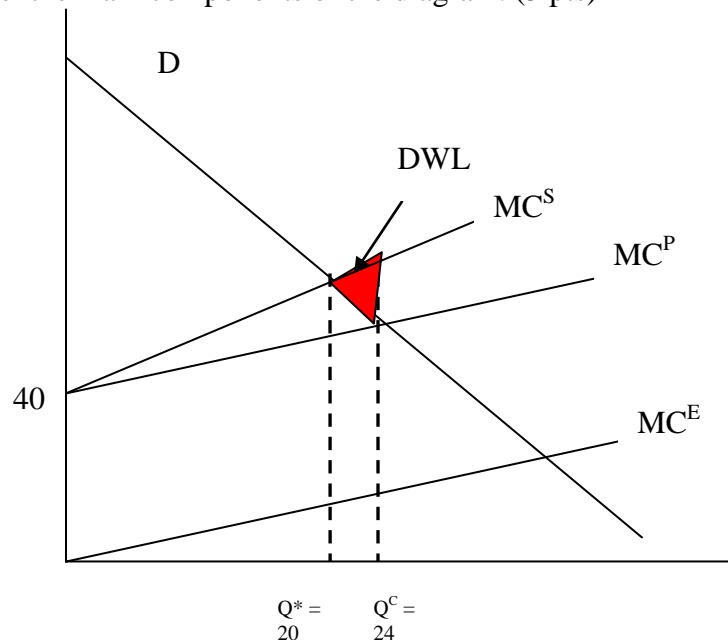
The social marginal cost is the sum of this private marginal cost and the marginal external cost. $MC^S=MC^P+MC^E$ (1 pt) $=40+0.5Q+0.5Q=40+Q$. (1 pt)

b. What is the quantity of paper produced by the competitive market and what is the socially optimal quantity of paper (5 pts)? No diagram is needed in this part.

To find the competitive equilibrium quantity we set MC^P equal to the inverse demand: $40+0.5Q=100-2Q$ (1 pt), or $Q^C=60/2.5=24$

To find the socially optimal quantity of steel we must set the aggregate marginal social costs of steel production, MC^S , equal to the inverse demand. We get: $40+Q=100-2Q$, or $Q^*=60/3=20$.

c. Using a diagram, illustrate the demand curve, the marginal cost curves, the competitive output, the socially optimal output and the deadweight loss. Calculate the deadweight loss. The diagram does not need to be to scale but general shapes and relationships should be correctly shown. Label the main components of the diagram. (5 pts)



DWL is the sum of two right angle triangles and is 24