Midterm 1

You have until 1:50pm to complete the exam, be certain to use your time wisely. Answer all
questions directly on the exam. You must show all of your work to receive full credit. Non-
graphing calculators may be used (no graphing calculators or phones can be used). You may leave
answers as fractions. Unless a problem says otherwise, you can assume that firms can produce
fractions of units and charge non-integer prices (so a firm could produce 82.4 units and sell at a
price of $5.325 per unit). Remember to put your name on the exam. Good luck!

Name: **ID Number:**

1. (15 points) Two cell phones companies are planning to merge. As a result of the merger, the
   Herfindahl-Hirschman Index for the cell phone industry would increase substantially.

   (a) Explain why the federal government would likely try to block the merger. Be certain to
       specifically address the concerns the government may have related to the effects of the
       merger on efficiency and equity in the cell phone market.

   (b) Provide an argument that the cell phone companies may make to the federal government
       suggesting that the merger should be allowed to go through.

   (c) How would the definition of the relevant market affect the federal government's analysis
       of the merger? If the market were defined to include all telephone service rather than
       just cell phone service, how might the government's conclusions change?

2. (15 points) Suppose that the supply of apartments in Williamsburg is completely inelastic. In other words, the same quantity of apartments, A^*, will be rented out no matter what the market rent is. The demand curve for apartments is linear and downward sloping.

   (a) Graph the supply and demand curves for apartment rentals in Williamsburg. On your graph, label the equilibrium quantity of apartments and rent in the absence of any government regulation.

   (b) Suppose that the city council decides that the equilibrium rent is too high and imposes a rent ceiling of $\overline{R}$. Assuming $\overline{R}$ is below the equilibrium rent in part (a), show the effects of this rent ceiling on the equilibrium rent and quantity of apartments on your graph.

   (c) Has the rental market become less efficient? Be certain to explain your answer.

3. (30 points) There are two ham stores in Williamsburg. Both stores have constant marginal costs equal to $20 per ham and no fixed costs. The inverse demand function for hams is given by:

$$p(H) = 200 - H \tag{1}$$

where H is the number of hams consumed. Suppose that the two stores compete on price with one another. If they announce the same price, they split demand equally between them. If they announce different prices, the store offering the lower price gets all of the demand (and must provide as many hams as customers want at that price).

(a) What will the equilibrium price of a ham be and what will individual firm profits be?

(b) Suppose that firm A knows that firm B will go out of business and stay out of business if the market price is ever at or below $15. Explain how firm A could use predatory pricing to increase the present value of the firm's stream of profits.

(c) Now suppose that firm B would go out of business if the price drops to $15 but will return once they see a price at which they could earn positive profits. So if the price is $15 in period 1, the firm will drop out of the market entirely for period 2 and stay out as long as prices stay low. However, if they see the price rise to a level in period t that would earn them positive profits, they will return to the market in period $t+1$ and remain in the market from that point on. Write down an expression giving the present value of firm A's profits from predatory pricing. Assume that when firm B is in the market, it will charge the equilibrium price from part (a).

(d) If the interest rate is 20 percent, will firm A engage in predatory pricing? Be certain to show all work necessary to justify your answer.

(e) Given your answer to part (d), should the government make an effort to regulate predatory pricing? Would your answer change if the interest rate were higher? Would your answer change if the interest rate were lower?

4. (10 points) Consider the graph below showing the total costs (TC) and total benefits (TB) of government regulation in a particular industry. The horizontal axis measures the amount of regulation (zero would mean no regulation is taking place) and the vertical axis is measuring costs and benefits in dollars.

   (a) On the graph, show where the optimal level of regulation would be. Explain why your chosen level of regulation is optimal.

   (b) Explain why the total benefit curve has a diminishing slope while the total cost curve has an increasing slope as the level of regulation gets larger.
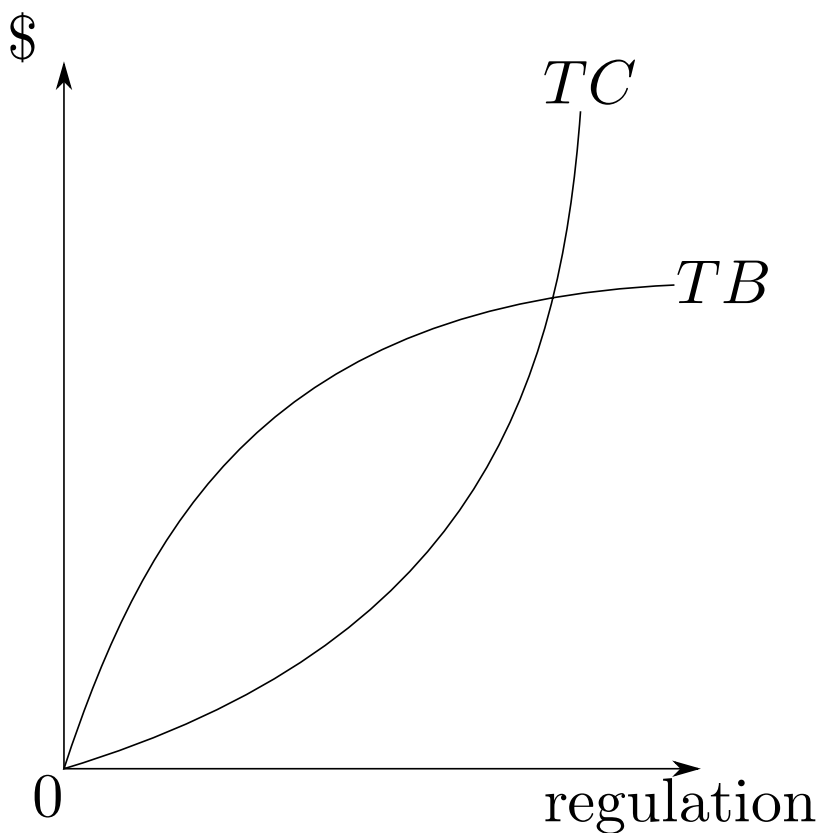
5. (30 points) There is a single firm (firm A) producing stereos for the local market. The inverse demand function for stereos is given by:

$$p(S) = 100 - S \tag{2}$$

where $p(S)$ is the price customers are willing to pay for a S stereos. The total cost function, $C(S)$, and the marginal cost function, $MC(S)$, for the firm are:

$$C_A(S_A) = \frac{1}{4}S_A^2 \tag{3}$$

$$MC_A(S_A) = \frac{1}{2}S_A \tag{4}$$

Currently this market is not regulated and the firm acts as a monopolist.

(a) Assuming the firm maximizes profits, what price will the firm charge, how many stereos will the firm sell and what will total surplus be?

(b) Now suppose that a second firm (firm B) with identical cost functions enters the market. The two firms compete on quantity. Market price is then determined by whatever consumers are willing to pay at a quantity of $S_A + S_B$. Write down firm A's profit maximization problem now that it is competing with firm B.

(c) Find an expression giving firm A's profit maximizing quantity as a function of the number of stereos firm B produces.

(d) Solve for the new equilibrium price and quantity of stereos now that firm B has entered the market. By how much has the arrival of the second firm changed total surplus?

(e) Going back to the case of a single firm, suppose the government is considering two different approaches to reducing the inefficiencies generated by a monopoly. The first would be to spend money on an ad campaign to get a second firm to enter the market, leading to the outcome you solved for in part (d). The second approach would be to let firm A remain a monopoly but require firm A to produce at the duopoly price and quantity from part (d). The costs of monitoring firm A under this approach would be identical to the costs of the ad campaign under the other approach. Assuming the government cares only about maximizing total surplus, which regulatory approach should it take? Be certain to justify your answer.