Midterm exam

Instructions: You have 75 minutes to complete this exam. Write your answers in the blue book provided to you. Credit, including partial credit, will depend principally on your explanations, so be sure to write thorough answers. Throughout, 'it depends' is an acceptable answer, but you will get no credit unless you explain on what it depends. Good luck!

1. Donny's Discount Trampolines estimates that the price elasticity of demand for their product is $\epsilon = -.3$. Donny's cost function is $c(Q)$. Donny is considering increasing his price by 5%.

   a. **(5 points)** Will Donny's revenue increase or decrease? Explain why.

   b. **(5 points)** Will Donny's profit increase or decrease? Explain why.

2. Trudy operates a copy shop. She estimates the price elasticity of demand for her product is $\epsilon = -1.1$. She is considering increasing her price by 5%. It costs Trudy $c(Q)$ to make Q copies in a given day.

   a. **(5 points)** Will Trudy's revenue increase or decrease? Explain why.

   b. **(5 points)** Will Trudy's profit increase or decrease? Explain why.

3. Suppose the market for lawn care services in Lexington is perfectly competitive, with each firm having a cost function equal to $c(Q) = 32 + Q + \frac{1}{2}Q^2$, where Q is the number of man hours spent working on lawns (so that marginal cost is $c'(Q) = 1 + Q$). The demand for lawn care services is given by $P = 49 - \frac{1}{3}Q$.

   a. **(10 points)** Solve for the long-run equilibrium price and quantity.

   b. **(5 points)** How many firms are in the market in the long run?

4. Danforth has a utility function over books (B) and movies (M) given by $u(B, M) = 6BM^3$, so that $MU_B = 6M^3$ and $MU_M = 18BM^2$. A book costs \$15, while a movie costs \$10; Danforth's entertainment budget is \$120.

a. (5 points) On a large, carefully-labeled graph, shade in the set of all points Danforth prefers to consuming 3 books and 6 movies. Explain in words how you know your answer is right.

b. (5 points) On a separate, carefully-labeled graph, shade in the set of all points which are cheaper than consuming 6 books and 3 movies. Again, explain in words why your answer is right.

c. (10 points) Solve for Danforth's optimal consumption of books and movies. Support your answer.

5. Sam is considering purchasing a membership in the Harbuck's "coffee club", which costs \$20/month, but lowers the price of a coffee from \$4 to \$3 for members. He has \$140/month he spends on either coffee (C) or doughnuts (D). The price of a doughnut is \$1.

a. (10 points) On the same graph, draw two budget sets, one in which Sam purchases the membership, and one in which he does not.

b. (10 points) Sam's utility function is given by $u(C, D) = \min\{C, D\}$. Should he purchase the membership?

c. (5 points) Now suppose Harbuck's is considering changing its membership fee. Solve for the fee at which Sam is indifferent between becoming a member and not doing so.

6. Pazzo's, a restaurant/bar in Lexington, estimates that the demand function for its beer is given by $P = 10 - \frac{1}{10}Q$, where Q is thousands of beers consumed per month. Pazzo's has a constant marginal cost of beer of \$2.

a. (10 points) Solve for Pazzo's profit-maximizing price and quantity.

b. (5 points) What is Pazzo's Lerner index?

c. (5 points) Give an example of something that could happen which would lower Pazzo's Lerner index.