

Place your name on the back of this sheet of paper and nowhere else. Staple your answers on the front of this sheet of paper. Failure to follow these directions will cost you 10 points. If you use double-sided printing or write on the back of scrap paper, I will give you one additional point.

If you are going to miss class due to leaving early for Spring Break, turn this in before you leave.

Show all work for all questions which have work.

The book is wrong about the own-price elasticity. You do not put a negative sign in front of the elasticity. There are two reasons for this. 1) Most other elasticities, the sign is very important, so it is best to not get rid of the sign. 2) In theory, there are Giffen goods which will have a positive sign. Therefore, the own-price elasticity can be either positive or negative.

1) (10 points) Find the own-price elasticity of demand for $P = 100 - 2Q$ in function form and then find its value for $P = 5$. Is the demand curve elastic or inelastic there? Explain your logic.

2) (10 points) Suppose the demanded function is given by $P = 100/Q$. Find the formula for the own-price elasticity. What does that tell you about the elasticity of demand? Explain your logic.

3) (10 points) Suppose the quantity demanded as a function of income is given by $Q = I/100 - 20$. Find the formula for the income elasticity. Find the income elasticity at an income of \$10,000. What does that tell you about the demand? Explain your logic.

4) (20 points) Suppose the TC curve was given by $TC(Q) = 50 + 2Q + 1/4Q^2$. Find the ATC curve. Find the formula for the slope and the formula for the curvature of the ATC curve. Is ATC strictly convex everywhere, strictly concave everywhere, convex everywhere, concave everywhere, or convex in some places and concave in other places? Explain your logic.

5) (20 points) Suppose a monopoly was facing a demand curve given by $P = 80 - Q$ and its total cost curve is given by $TC = \frac{1}{2}Q^2 + 5Q + 7$. Find the profit-maximizing quantity and price. Prove the profit is maximized using the second derivative test.

6) (30 points) Suppose the demand curve for a book is given by $P = 100 - \frac{1}{2}Q$. 90% of the revenue goes to the firm and 10% goes to the author. The cost of publishing the book is given by $TC = \frac{3}{2}Q^2 + 12Q + 7$. Find the quantity which maximizes the author's income. Use the second derivative test to prove it is a maximum. Find the quantity which maximizes the firm's profits. Use the second derivative test to prove it is a maximum.