

Second Midterm Exam

Each part of a question (a, b, c, etc.) is worth 5 points. Make sure to allot your time accordingly. Total of 35 points, -1 for messiness, -2 for extreme messiness, +1 for bonus question.

Please write on one side of the blue book pages. When you are finished, please keep the exam sheet and hand in your blue book. Thanks.

1. *Luxray*. *Luxray* Inc. is a firm with cost function $TC(y) = y^2 + 10$. This firm is a perfectly competitive price-taker in a market where $p = 100$.
 - (a) Write down *Luxray*'s average cost function, average variable cost function, and marginal cost function. Why does *Luxray* produce $y^* = 50$ in short-run equilibrium?
 - (b) Find *Luxray*'s net profit at $y^* = 50$. Write it down three ways and verify that they are all equal: (i) total revenue minus total cost, (ii) net profit margin times quantity, (iii) operating profit margin times quantity, minus fixed costs.
 - (c) Suppose that the cost functions we have been working with *are* the long-run cost functions. However, firms may enter or exit this market freely in the long run. Should *Luxray* management expect to produce more or less than 50 units as the industry moves toward long-run equilibrium? Explain using a graph.

2. *Snowboards*. There has been a recent collapse of interest in snowboarding. This is because of advances in ski technology that make skiing more fun for many people.
- (a) Draw a graph of the supply and demand of snowboards. Show what happens as a result of the decline in peoples' interest in snowboards. Label the old and new equilibrium quantities and prices.
 - (b) Is there deadweight loss associated with the change in part (a)? Explain why or why not, and if there is, show it in the diagram.
 - (c) Now let's be more specific. Snowboard market demand is $x(p) = a - p$ and snowboard market supply is $s(p) = 3p$. Find an expression for $\frac{dp}{da}$. Prove whether $\frac{dp}{da}$ is positive or negative.
 - (d) And now a slightly harder version. Let's say we don't actually know the specific functional forms of demand. All we know is that there is some demand function $x(p, a)$ that is decreasing in p and increasing in a . And we know there is some supply function $s(p)$. And of course we know that supply equals demand. Using the total differential, find an expression for $\frac{dp}{da}$. Try to write the expression in elasticity form (but it won't be as neat as some of our other examples, you'll still have some extraneous stuff). Prove that the expression is positive.
 - (e) Bonus +1 point, don't play around with this unless you have extra time. In (d), you could find an expression for the elasticity of p with respect to a . If you do that, you can make the entire expression a relationship between various elasticities.