

ECON 110, Professor Hogendorn, Fall 2019

First Midterm Exam

By handing in this exam, you accept an obligation under the Wesleyan Honor Code not to discuss the exam with other students except those who have already taken it.

Each part of a question (a, b, c, etc.) is worth 5 points. Make sure to allot your time accordingly. Total of 25 points, –1 for messiness.

When you are finished, please put the exam sheet in your blue book.

1. Suppose a user values their time at \$20 per hour (or \$0.33 per minute) and receives utility $u(i) = 7.25i^{1/2}$, measured in dollars per day, from liking i Instagram posts. If it takes them 3.8 minutes to find a post to like, how many likes do they give each day? What is their total utility per day, measured in dollars, for liking posts on Instagram, and how much is net value after deducting their cost of time? Show a diagram of the marginal benefit and marginal opportunity cost that depicts the decision of how many likes.
2. *Jets*. Two large jets, the A350-1000 and the Boeing 777X are designed to replace older, less fuel-efficient aircraft. Currently airlines have ordered 500 of these jets. The demand function for this segment of the aircraft market is $Q_d = 500P^{-1.8}$.
 - (a) Using the formula for price elasticity of demand, $E_d = \frac{\partial Q_d}{\partial P} \frac{P}{Q_d}$, find the elasticity of demand when $P = 1$.
 - (b) Suppose that the price of jet fuel falls by 40%. Which of the following is more likely to be the new demand curve for the

planes? Explain your reasoning (one could make good arguments either way).

$$Q_d = 400P^{-1.8} \quad Q_d = 600P^{-1.8}$$

- (c) Suppose supply of these airplanes is $S(P) = 500P$. Given your answer to part (c), find how equilibrium price and quantity change when the demand curve changes. Show the change in total spending on a diagram. How much is a change in producer surplus and how much in variable costs?
- (d) Label or highlight on your diagram the curve segments that give the marginal private benefit and marginal private opportunity cost of the change in the number of airplanes. What are some specific examples of what these marginal private benefits and private costs might be? Give an example of one positive and one negative externality that might plausibly apply to airplanes, including whether each applies to consumption or production. (Recall that externalities are benefits or costs that are *not* included in market transactions.)