ECON 110, Professor Hogendorn, Fall 2019

First Midterm Exam Section 2

By handing in this exam, you acknowledge under the Wesleyan Honor Code that you have not discussed it with anyone who took it yesterday, or that if you have, then you have written in your exam book what you learned and how it influenced your answers and accept that this may result in a reduced grade.

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 keep or recycle the exam sheet and hand 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 total benefit minus total opportunity cost that depicts the decision of how many likes to give.

2. *Jets2*. 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) What are the first and second derivatives of this function? Graph the function and explain how the first and second derivatives relate to the shape of the graph.

(b) Suppose that the price of jet fuel falls by 40% and that the new demand curve for the fuel-efficient airplanes becomes

$$Q_d' = 600P^{-1.8}$$

Is this surprising? Explain.

(c) If the supply of these airplanes is $S(P) = 500P$, find the equilibrium price and quantity using the original demand curve. Now suppose demand shifts as in part (b), but quantity does *not* change. Instead quantity remains the same like with a quantity control. What do you expect will be the new price? What will be the changes in consumer and producer surplus, both graphically and numerically?

(d) Label or highlight on your diagram the curve segments that give the marginal private benefit and marginal private opportunity cost airplanes in between the actual quantity and the socially optimal quantity. 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.)