

The following homework assignment is to be submitted via email to Isaiah Boyer at icb00014@mix.wvu.edu with a “cc” to me at roger.congleton@mail.wvu.edu. The answers are due 1 hour before class time on the day that we begin the next block of material in the course. They should be typed up and emailed to Isaiah in Word. (This will take a bit of time, but it is good practice.) Isaiah will grade them and I will return them in class shortly after he finishes grading them.

- (1) Suppose that Al will attend 4 years of university at a cost of \$20,000 per year and will earn an extra \$15,000 per year for the next 30 years as a consequence. What is the present discounted value of her college education at the moment that she begins to attend college if the interest rate is 3%, if it is 7%?
- (2) Suppose that Al purchases a lottery ticket for \$1 that has one chance in a million of winning \$15,000/year for 40 years beginning a year after she purchases the ticket if she wins. What is the expected present value of her ticket at the time of purchase if the interest rate is 3%; what is it if the rate is 7%?
- (3) Suppose that Al is thinking about purchasing a good from a local seller, Bob, that is known to have low-quality units fraction P of the time and high-quality units fraction $(1-P)$ of the time. Al has two different net total benefit functions, one for the low-quality good and the other for the high-quality good. Both are strictly concave and increase as her personal income increases. Determine her demand function for this merchant's product if she cannot determine the difference between high- and low-quality units at the time of purchase.
- (4) Suppose the local seller in problem 3 realizes that by increasing the probability of high-quality units, his demand and profits may be higher. He can do so by monitoring his production process more carefully. (a) Characterize both his monitoring effort and the price that he'll charge if he has N customers similar to Al. (b) Discuss the sense in which Bob can be said to be a productive part of the manufacturing process in this case.
- (5) Suppose that the number of customers that Bob serves every day is distributed normally with mean 50 and standard deviation 10. (a) If, in a typical visit, each customer purchases 5 units of the product he sells, how many units should he produce (or purchase to sell from a wholesaler) every day if Bob wants to “run out” less than 10% of the time? (b) Less than 5% of the time? (c) Write an expected value equation for sales (using the continuous-form expected value equation) that explains your conclusion.