

Problem Set 3, Econ 253

1. One important aspect of quality control in a manufacturing process is monitoring the amount of a product being packaged. For instance, the amount of coffee in an eight-ounce jar of Sancafe Instant Coffee is a normal random variable, with mean 8.00 ounces and variance 0.04. Find the probability that a randomly chosen jar will contain at most 7.8 ounces.
2. Suppose a company sells a package of 4 bulbs, labeled “average life 1000 hours.” Suppose each bulb has a lifetime that is normally distributed with mean 1000 and standard deviation 200. Mr. Edison, who buys this package, will be satisfied only if all four last at least 1200 hours. What is the probability he will be satisfied? (Assume the performance of each bulb is independent of the performance of any other bulb).
3. Ike and Mike work in the advertising mailroom of a large company filling orders for members of the sales force. The amount of time it takes Ike to fill a randomly chosen order is approximately normal with mean 10 minutes and S.D. of 3 minutes. The amount of time it takes Mike is also normal with mean 12 minutes and S.D. 4 minutes. Assume they work independently of each other. If they are each given a randomly chosen order and start work together, what is the probability that Ike will finish before Mike?
Hint: (a) Use the properties of normal random variables, (b) Use the formula for expectation of a sum (difference) of two random variables, (c) Use the formula for the variance of a sum (difference) of two random variables.
4. Crates delivered by a freight company have a mean weight of 240 pounds and a standard deviation of 66 pounds. Suppose the company has a truck that can take no more than 8000 pounds, and it needs to transport 36 crates, picked at random. What is the probability that the weight of the 36 crates will exceed 8000 pounds?