Problem set 2

S520

Upload your answers as one file (PDF preferred) through the Assignments tab on Canvas by 11:59 pm, Thursday 7th September.

Trosset question numbers refer to the hardcover textbook. Show working. You may work with others, but you must write up your homework independently — you should not have whole sentences in common with other students or other sources.

1. Trosset chapter 3.7 exercise 12, parts (e), (f), and (g) (independent or dependent.) Verbal explanations are sufficient, though feel free to Google data if it helps you. Note: A "Western" is a genre of movie (with cowboys and outlaws and stuff), not a reference to where the movie was made.

2. Trosset chapter 3.7 exercise 11.

3. (From the Summer 2016 midterm.) According to the Breast Cancer Surveillance Consortium (`breastscreening.cancer.gov`), out of the population "women aged 50–54 who have screening mammograms,"

   - 0.428% have breast cancer;
   - Of those with breast cancer, 82.6% correctly test positive on the mammogram;
   - Of those without breast cancer, 90.4% correctly test negative on the mammogram.

   (a) What is the probability that a randomly selected woman from this population both has breast cancer and test positive?

   (b) What is the probability that a randomly selected woman from this population tests positive?

   (c) Given that a randomly selected woman tests positive, what is this probability she has breast cancer?

   (d) Suppose that out of a large sample from this population, ten women test positive. What is the probability that at least one of these ten women has breast cancer?

4. Let X be a random variable with the following cumulative distribution function (CDF):

$$F(y) = \begin{cases} 0 & y < 0 \\ y/2 & 0 \leq y < 1 \\ (y+1)/4 & 1 \leq y < 3 \\ 1 & y \geq 3 \end{cases}.$$

   (a) What's $P(X \leq 2)$?
   (b) What's $P(X > 2)$?
   (c) What's $P(0.5 < X \leq 2.5)$?
   (d) What's $P(X = 1)$?
   (e) Let q be a number such that $F(q) = 0.6$. What's q?

5. Trosset chapter 4.5 exercise 2.

6. Trosset chapter 4.5 exercise 3.