PHIL 103: Logic and Reasoning QRII

Practice #8

1. Suppose you are a teacher. One day, a student says to you, "I don't have my homework today because my dog ate it." Your prior degree of belief that any given homework will be eaten by a dog is very low: 0.01. You also have credence of 1 that your student would say that a dog ate the homework given that a dog really did eat the homework. And finally, you have credence of 0.5 that your student would say that a dog ate the homework given that a dog *didn't* eat the homework. If you are a personalist Bayesian, what degree of belief should you have that a dog really did eat the homework? Do you think you should *believe* your student? Explain your answers.

2. Suppose you know that your cell phone has a probability 0.01 of dropping a call when it is within five miles of a cell tower but a probability 0.05 of dropping a call when it is at distances beyond five miles from a tower. Further suppose that you think you are equally likely to be within five miles as beyond file miles from any tower. You make a call, but in the middle of your conversation, it is dropped. If you are a personalist Bayesian, what probability should you assign to the claim that you are beyond five miles from a cell tower?

3. According to the Census of Fatal Occupational Injuries, the probability that a randomly chosen worker was fatally injured on the job in 2013 was about 32 in 1,000,000. In 2013, men made up approximately 57% of the workforce (by hours) and suffered 93% of fatal injuries. What is the probability that a randomly chosen worker suffered a fatal injury given that the worker was a man?

4. The probability that a police officer suffered a fatal injury in 2013 was 106 in 1,000,000. By comparison, the probability that a roofer suffered a fatal injury in 2013 was 387 in 1,000,000. Suppose you learn that a randomly chosen worker suffered a fatal injury. Which hypothesis does the evidence favor: that the worker was a police officer or that the worker was a roofer? Suppose you want to know how likely it is that the randomly chosen person was a police officer. What further fact do you need? Find an estimate of that further fact and calculate the probability.

5. Suppose I have a fair coin. What is the probability of observing at least three heads in five tosses given that I observe heads on the first toss? What is the probability of observing at least three heads in five tosses given that I observe at least two heads in five tosses?

6. Suppose the chances of being struck by lightning on any given day are 1 in 1,000,000 and four times that if it is raining. Suppose that this week, there is a 60% chance that it will rain on Saturday and a 30% chance that it will rain on Sunday. Suppose further that the probability of being struck on any given day is the same as the conditional probability of being struck given that one was not struck on the previous day. What is the probability of either being struck on Saturday or not being struck on Saturday and being struck on Sunday?

7. Suppose you are getting on the bus in the morning. To your surprise all ten of the seats on the left side of the bus are filled, while all ten of the seats on the right side are empty. Assuming that passengers sit down one at a time and that each passenger selects his or her seat at random from the available ones, what is the probability that this configuration would occur? Give two reasons why you wouldn't expect to observe such an arrangement in real life.

8. Given the same modeling assumptions as in Problem #7, what is the probability that the first ten passengers all sit on the left side of the bus given that the first five passengers all sit on the left side of the bus?