HOMEWORK #24: BAYESIAN STATISTICS!!!

DISEASE PREVALENCE AND PROBABILITY

**SHOW ALL YOUR WORK!!!**

1. A MAN GETS TESTED FOR HIV AND TESTS POSITIVE FOR THE DISEASE. IF THE TEST IS 96% ACCURATE AND 1 OUT OF EVERY 1500 INDIVIDUALS IN THE US (IN HIS AGE GROUP) HAS THE DISEASE, WHAT IS THE PROBABILITY THAT THE MAN WHO TESTED POSITIVE ACTUALLY HAS HIV?

PUT YOUR ANSWER INTO WORDS:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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2. BAGS are screened at the local Providence airport. 74% of bags that contain a bomb will trigger an alarm. 18% of bags that do not contain a bomb will also trigger the alarm. If 1 out of every 1300 bags contains a bomb than what is the probability that a bag that triggers an alarm actually contains a bomb?

PUT YOUR ANSWER INTO WORDS:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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3. A WOMAN TESTS POSITIVE FOR A GENETIC DISEASE KNOWN AS SICKLE CELL ANEMIA WHICH EFFECTS BLOOD CELLS AND OXYGEN USE. THE TEST FOR THE DISEASE IS 92.5% ACCURATE. IF THE PREVALENCE OF THE DISEASE IN SOCIETY IS 1 IN EVERY 1,200, WHAT IS THE PROBABILITY THAT THE PERSON WHO TESTS POSITIVE ACTUALLY HAS THE DISEASE?

PUT YOUR ANSWER INTO WORDS:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. BAGS are screened at PHILADELPHIA AIRPORT. 91% of bags that contain a BOMB will trigger an alarm. 3% of bags that do not contain a BOMB will also trigger the alarm. Given that 1 out of every 10,500 bags contains a BOMB and the airport screens about 52500 bags per day, answer the questions below.

A.) How many of the bags that DO contain a BOMB will set the alarm off in a day?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

B.) How many bags that do NOT contain a BOMB will set off the alarm in a day?\_\_\_\_\_\_\_\_\_\_\_\_

C. How many total bags will set off the alarm in a day?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

D.) What is the probability that a bag that triggers an alarm actually contains a BOMB?\_\_\_\_\_\_\_\_\_\_\_\_\_

E.) PUT YOUR ANSWER TO PART D INTO WORDS?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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