HW 3 covers sections Law of Total Probability, Bayes Rule, and Reliability

#1. 2.7 on page 34.

#2. 2.17 on page 35 (change the word “if” to “given”).

#3. 2.18 on page 35 (change the word “if” to “given”)

#4. 2.19 on page 35.

#5. 2.20 on page 35 (change the word “if” to “given”).

#6. A diagnostic test for a certain disease has 95% sensitivity (a positive test given the person has the disease) and 95% specificity (a negative test given the person does not have the disease). Only 1% of the population has the disease in question. Given the diagnostic test reports that a person chosen at random from the population tests positive, what is the probability that the person does, in fact, have the disease? Are you surprised by the size of the answer? Do you consider this diagnostic test reliable?

#7. In a particular community, 70% of the voters are Democrats, and 30% are Republicans. Sixty percent of the Democratic voters and 40% of Republican voters favor the incumbent. What is the probability that a randomly selected voter from this community favors the incumbent?

#8. 2.21 on page 36

#9. 2.22 on page 36

#10. 2.25 on page 36. Hint for (a): use equally likely outcomes formula; at least two share birthday is the complement of no one shares birthday with the other or all have different birthdays. (b): use trial and error to find the smallest n that gives the probability of 0.5 or higher.