Question 1

(1/1 point)

Let's walk through an example similar to the one given in class. Assume that the probability of having a rare condition is 1%. It is possible to test for the condition, but the test is imperfect. If you have the condition, there is an 85% chance that you will test positive. If you do not have the condition, there is a 5% chance that you will test positive. Call the condition c, so that P(c) = 0.01, and call a positive test t+, so that p(t+|c) = 0.85.

What is the probability p(t+) that you test positive for the condition? (Please put your answer to 3 decimal places. For example, if the correct answer is 0.6724, please input 0.672.)

0.058 ✔ **Answer:** 0.058

0.058

EXPLANATION

We know that the probability of testing positive given that you have the condition is 85% and the probability of testing positive if you do not have the condition is 5%. Furthermore, we know that the probability of having the condition is 1%, so the probability of not having the condition must be 100% - 1% = 99%. Overall, p(t+) = p(t+|c)*p(c) + p(t+|c')*p(c') = 0.85 * 0.01 + 0.05 * 0.99 = 0.058, or 5.8%

You have used 1 of 2 submissions

Question 2

(1/1 point)

Suppose that you tested positive for the condition. What is the probability that you truly have the underlying condition? (Please put your answer to 2 decimal places. For example, if the correct answer is 0.6724, please input 0.67.)

0.15 ✔ **Answer:** 0.15

0.15

EXPLANATION

From above, we know that the probability of testing positive, p(t+), is 5.8% or 0.058. We know the probability of testing positive given that you have the condition, p(t+|c), is 85% or 0.85, and that the probability of having the condition is 1% or 0.01. Using Bayes rule, p(c|t+) = (p(t+|c)*p(c)) / p(t+) = (0.85 * 0.01) / 0.058 = 0.1466 = 0.15 or 15%.

You have used 1 of 2 submissions

Question 3

(1/1 point)

Suppose that a new test is developed that is more accurate. Now, the probability of testing positive if you have the condition is 94%, and the chance of testing positive if you do not have the condition is only 4%. Now, what is the probability p(t+) that you test positive for the condition? (Please put your answer to 3 decimal places. For example, if the correct answer is 0.6724, please input 0.672.)

0.049

Answer: 0.049

0.049

EXPLANATION

As before, p(t+) = p(t+|c)*p(c) + p(t+|c')*p(c') = 0.94 * 0.01 + 0.04 * 0.99 = 0.049 or 4.9%.

You have used 1 of 2 submissions

Question 4

(1/1 point)

If you test positive, what is the probability that you have the underlying condition? (Please put your answer to 2 decimal places. For example, if the correct answer is 0.6724, please input 0.67.)

0.19

Answer: 0.19

0.19

EXPLANATION

Using Bayes rule, p(c|t+) = (p(t+|c)*p(c)) / p(t+) = (0.94 * 0.01) / 0.049 = 0.1918 = 0.19 or 19%.

You have used 1 of 2 submissions

Question 5

(1/1 point)

Suppose that there is an 80% chance you will be invited to a dinner party on a Friday or Saturday evening. In contrast, there is only a 50% chance that you will be invited to a dinner party on one of the other nights of the week. Suppose that you know that you've been invited to a dinner party tonight, but have forgotten which day of the week it is. Once you know that you've been invited to a dinner party, what is the chance that it is either Friday or Saturday? (Please put your answer to 2 decimal places. For example, if the correct answer is 0.6724, please input 0.67.)

0.39 ✔ **Answer:** 0.39

0.39

EXPLANATION

Let p(I) denote the probability that you are invited and p(I') denote the probability that you are not invited. Let p(fs) denote the probability that it is Friday or Saturday and p(fs') denote the probability that it is not Friday or Saturday. You are given that p(I|fs) = 0.8 and p(I|fs') = 0.5. You are not given p(fs), but can calculate this as 2/7 = 0.2857 or 29% (two of the possible seven days of the week). Using Bayes rule as before, p(fs|I) = (p(I|fs)*p(fs)) / p(I) = (p(I|fs)*p(fs)) / (p(I|fs)*p(fs) + p(I|fs')*p(fs') = (0.8 * 0.2857) / (0.8 * 0.2857 + 0.5 * 0.7143) = 0.39 or 39%.

You have used 1 of 2 submissions