**3.2.6. Drill – Exercises in Bayes’ Rule**

Now it's time to use Bayes' rule to compute some conditional probabilities. First look over the numbers and estimate each of the four probabilities, using your intuition. Then, calculate the probabilities using Bayes' rule. Keep track of your work in a Google document or markdown file that you can share with your mentor.

A diagnostic test has a 98% probability of giving a positive result when applied to a person suffering from Thripshaw's Disease, and 10% probability of giving a (false) positive when applied to a non-sufferer. It is estimated that 0.5 % of the population are sufferers. Suppose that the test is now administered to a person whose disease status is unknown. Calculate the probability that the test will:

|  |  |  |
| --- | --- | --- |
|  | Disease (0.5%) | No Disease (99.5%) |
| Test Positive | *98% (++)* | *10% (+-)* |
| Test Negative | 2% | 90% (--) |

1. **Be positive**

P(*positive outcome*) = (0.005 x 0.98) + (0.995 x 0.10) = 0.1044 = 10.4%

1. **Correctly diagnose a sufferer of Thripshaw's**

(++)

P(correct diagnosis) = 0.98 = 98%

1. **Correctly identify a non-sufferer of Thripshaw's**

(--)

P(correct non-sufferer) = 0.90 = 90%

1. **Misclassify the person**

(+-)

P(misclassification) = 0.10 = 10%