Exercises 1

knitr::opts\_chunk$set(echo = TRUE)

# Probability Practice

## Part A

We know:

* P(RC)=0.3
* P(TC)=0.7
* P(Y|RC)=0.5
* P(N|RC)=0.5
* P(Y)=0.65
* P(N)=0.35

We have to find P(Y|TC)=?

P(Y)=P(Y|TC)P(TC)+P(Y|RC)P(RC)

0.65=0.7x+0.5(0.3)

0.5=0.7x

P(Y|TC)=5/7

**The fraction of truthful speakers who answered Yes is 5/7 or 71.4%**

## Part B

We have,

* Sensitivity=P(T|D)=0.993
* Specificity=P(T'|D')=0.9999

P(D|T)= (P(T|D)P(D))/P(T)

P(D)=0.000025

P(T|D)P(D) = 0.993 \* 0.000025 = 0.000024825

P(T) = P(T|D)P(D)+P(T|D')P(D') = 0.9930 \* 000025 + (1-0.9999)(1-0.000025) = 0.0001248

So, P(D|T) = 0.000024825/0.0001248 = 0.1989 (~19.9%)

**This shows that even if you test positive for a disease, you have a 19.89% chance of actually having the disease. This chance is so low that it seems like this is not an ideal test for this particular disease.**