

1. Suppose a spam filter is trained on 500 spam messages and 200 messages that are not spam. The word "exciting" appears in 40 spam and 25 nonspam messages.
- What is the probability a message is spam if it contains the word "exciting"?
 - What is the probability it is not spam if it does not contain the word "exciting"?

2. What is the expected number of 6's when a fair die is rolled 20 times?

3. Suppose we flip a fair coin until it comes up heads twice. What is the expected ~~number~~ number of flips?

4. Show that if $X_1, \dots, X_n$ are mutually independent, $E\left(\prod_{i=1}^n X_i\right) = \prod_{i=1}^n E(X_i)$.

5. Show that $V(aX+b) = a^2 V(X)$ where $a, b \in \mathbb{R}$.