1. Do the following problems from the book: 2.1.5, 2.1.10, 2.1.11, 2.2.4, 2.2.6, 2.3.6, 2.3.12, 2.4.7, 2.4.10, 2.5.4, 2.5.8, 2.6.2, 2.6.9, 2.6.22.

2. Suppose you have a jar with 999 fair quarters and 1 two headed quarter. Suppose you pick one coin out of the jar and flip it 10 times getting heads every time. What is the probability that the coin you selected is the two headed coin?

3. Of the $2^n$ people in a given collection of $n$ couples exactly $m$ die. Assuming that the $m$ have been picked at random (meaning each collection of $m$ people is equally likely) find the mean number of surviving couples.

4. Suppose we have a random variable $X$, and we predict the value of $X$ to be $d$.
   
   (a) If we say that the quality of the prediction $d$ is determined by its mean square error (MSE)
       \[ m(d) = E[(X - d)^2]. \]
       What value of $d$ is the best predictor for the random variable $X$? Show your work.
   
   (b) (Optional) Assume that the random variable $X$ is continuous. Now assume that the quality of the prediction is determined by its absolute mean error
       \[ a(d) = E[|X - d|]. \]
       What value of $d$ is the best predictor for the random variable $X$? Show your work.

5. (Optional) Another coin tossing question. Suppose you have a fair coin, let $N$ be the number of tosses until the coin lands heads three times in a row. For example if the first three tosses are heads then $N = 3$. Find $E[N]$. 
