Homework Assignment 5
Due Friday Feb 24th by 5pm via Canvas

SDS 321 Intro to Probability and Statistics

1. (2+2+2) $X \sim Bernoulli(p)$. Define a random variable $Y := 2^X 3^{1-X}$.

   (a) Write down the PMF of Y.
   (b) What is $E[Y]$?
   (c) What is var(Y)?

2. (1+4+1) 3 German Shepherds and 3 Siberian Huskies enter a dog show. At the end of the show a ranking of the 6 dogs is provided. Assume that all rankings are equally likely. Let X denote the highest ranking obtained by a German Shepherd. For example, $X = 1$ if a German Shepherd is the show winner.

   (a) What values can X take?
   (b) Write down the PMF.
   (c) What is $E[X]$?

3. (2+2+4)You have a fair coin and a biased coin. The first biased coin lands heads with probability .5 whereas the second lands head with probability .8. You choose one of these coins at random and now toss it 10 times.

   (a) What is the probability that the coin will land on heads exactly 5 out of 10 times?
   (b) What is the probability that the coin will land on a head in the first toss?
   (c) What is the probability that the coin will land on heads exactly 5 out of 10 times given that it lands on a head in the first toss?