HW2
Due date Feb 13

1. A die has six sides that come up with different probabilities:

   $\Pr(1) = \Pr(2) = \Pr(3) = \Pr(4) = 1/8, \Pr(5) = \Pr(6) = 1/4.$

   (a) You roll the die; let Z be the outcome. What is E(Z) and var(Z)?
   (b) You roll the die 10 times, independently; let X be the sum of all the rolls. What is E(X) and var(X)?

2. A box contains 9 red marbles and 1 blue marbles. Nine hundred random draws are made from this box, with replacement. What is distribution of the number of red marbles seen, roughly?

3. Suppose that in the world at large, 1% of people are left-handed. A sample of 200 people is chosen at random. Give a 99% confidence interval for the number of them that are left-handed.

4. Poisson: Calculate the maximum likelihood estimate of λ

   $P(X = x) = \lambda^x e^{-\lambda} / x!$

   Assume you have n observations: X1, X2, . . . , Xn iid observations from a Poisson random variable. (Hint: Use log-likelihood).

5. A) A coin is flipped 100 times. Given that there are 55 heads, find the maximum likelihood estimate for the probability p of heads on a single toss using maximum likelihood estimation and Binomial distribution assumption.
   B) Redo part A using log likelihood.