1. Practice Problems

(1) Let the random variable X be the length of the word corresponding to the number you roll with a fair six-sided die. For example "zero" would have length 4. What is the pmf for X?

(2) There are four blood types: A, AB, B, O, which are determined by alleles A,B,O as follows:

A	AA or AO
B	BB or BO
AB	AB
O	OO

Suppose a couple has blood type AB and A. If their first child has genotype AA, what is the probability that the second child will have blood type B?

(3) A ball is drawn 5 times from a hat containing 10 balls: 4 black and 6 white, replacing the ball after each draw. What is the probability of drawing exactly 3 black balls?

(3*) For the next trial, you use the same hat but do not replace the balls. What is the probability of drawing exactly 3 black balls?

(4) (Ross Ch.4,6f) A communication system consists of n components each of which will, independently function with probability p. The total system is able to operate effectively if at least one half of its components function.
   (a) For $n = 3$ and 5, what is the probability that the system will operate effectively?
   (b) (Algebra Challenge) For what value of p will the system be more effective for $n = 5$ than $n = 3$?

(5) (Ross Ch.4,8i) Julie buys lightbulbs for her hardware store in packages of 10. It is her policy to check 3 of the bulbs in a package; if any are defective, she will send back the package.
   (a) If 4 of the bulbs in a package are defective, what is the probability that Julie sends it back?
   (b) Out of all packages, 30% have 4 defective bulbs while 70% have 1 defective bulb. What is the probability that Julie sends back a randomly selected package?

(6) The number of typos in a page of a book is a Poisson random variable with $\lambda = 1/2$. What is the probability of having no typos on a given page?