1. Create a simulation to model the following situation.

Consider a family with 3 children. Let X be the number of boys in the family.

# boys	0	1	2	3	Total
${}_3C_k$					

In this situation $n = 3$ thus $P(X = k) = {}_3C_k \bullet p^k \bullet q^{3-k}$

Find the probability of the following:

a. No boys? $P(X = 0)$

b. At least 1 boy? $P(X \geq 1) = 1 - P(X = 0)$

c. Fewer than 2 boys? $P(X < 2)$

d. 2 or more boys? $P(X \geq 2) = 1 - P(X < 2)$

2. Create a simulation to model the following situation.

Consider a four-question test. Each question is multiple-choice with five choices. You forgot to study for the test and so guess randomly on each question. The probability of you guessing the correct answer for each question is …?

# correct	0	1	2	3	4	Total
${}_4C_k$						

In this situation $n = 4$ thus $P(X = k) = {}_4C_k \bullet p^k \bullet q^{4-k}$

Find the probability of the following:

a. No correct answers?

b. At least 1 correct answer?

c. All 4 correct?

d. At most 3 correct answers?

3. Create a simulation to model the following situation.

Consider this scenario from genetics. Suppose that we are interested in studying the offspring of two parents who we know both have a recessive and dominant gene. The probability that an offspring will inherit two copies of the recessive gene (and hence have the recessive trait) is 1/4.

Suppose we want to consider the probability that a certain number of children in a family with **six** children possess this trait.
Let X be the number of children with this trait. Create a distribution table for $n = 6$ with $p = 0.25$.

# with trait	0	1	2	3	4	5	6	Total
${}_6C_k$								

In this situation $n = 6$ thus $P(X = k) = {}_6C_k \bullet p^k \bullet q^{6-k}$

Find the probability of the following:

a. No children have the trait?

b. At least 1 child has the trait?

c. Exactly 3 children have the trait?