1. Suppose the numbers 1 through 5 are randomly positioned around a circle. Show that the sum of some set of 3 consecutive numbers is at least 9.

2. (a) How many ways are there to distribute 9 different books to 11 children if no child gets more than 1 book?

(b) How many ways are there to distribute 9 different books to 11 children if there is no limit on how many a child can have?
3. For which values of $p$ and $q$ and $r$ is the following statement true?

$$(p \lor \sim q) \land \sim r$$

4. What is the probability that a five card poker hand has a straight flush?

(A straight flush is an unbroken sequence of 5 cards of the same suit.)
5. Farrell Library contains 4 math books, 6 English books and 2 cookbooks.

(a) How many ways are there to select 2 books?

(b) How many ways are there to select 3 books, one of each type?

6. Prove that $n^3 - n$, $n = 1, 2, 3, \ldots$ is a multiple of 3.
7. (a) How many ways are there to rearrange the letters in the word “Manhattan”?

(b) How many of these arrangements begin with 2 or 3 consecutive vowels?

8. How many ways are there to distribute 10 cookies to 4 children if the first two children can receive at most a total of 3 between them?
9. (a) How many ways are there to divide a class of 11 distinguishable children into 3 teams so that the first team has 3 children and the second and third teams each have 4 children?

(b) How many ways are there to divide 11 indistinguishable children into 3 groups?

10. (a) What is the probability that a 4 digit number has no repeated digits, if we interpret “repeated” to mean within the number?

(b) What is the probability that a 4 digit number has no repeated digits, if we interpret “repeated” to mean consecutive?