1. If we write out 20!, how many zeroes are there at the end?

2. Determine the number of anagrams of:
   
   (a) SASSAFRAS
   
   (b) BOOKKEEPER

3. Consider three balls and three buckets. In how many different ways can the balls be
   arranged in the buckets if:
   
   (a) the balls and the buckets are all numbered?
   
   (b) the balls are numbered but the buckets are indistinguishable?
   
   (c) the buckets are numbered but the balls are indistinguishable?
   
   (d) the balls are indistinguishable and the buckets are indistinguishable?

4. Pokker is played with a 30-card deck: there are three suits and the cards are numbered
   1 up to 10. A player receives 4 cards.
   
   (a) How many possible pokker hands are there?
   
   (b) A straight contains cards of consecutive values, such as 5, 6, 7 8, but they can be
   of different suits. How many possible straights are there?
   
   (c) A flush has all cards the same suit. How many possible flushes are there?
   
   (d) A straight flush is a hand that is both a straight and a flush. How many possible
   straight flushes are there?

5. (a) Show that

   \[ \binom{n}{k} = \frac{n}{k} \binom{n-1}{k-1} \]

   provided \( k \) is positive.

   (b) Give a combinatorial proof of this.

6. Show that if \( p \) is a prime number, then \( \binom{p}{i} \) is a multiple of \( p \) for all \( i \) from 1 up to \( p - 1 \).

Due: Tuesday 12 September

Game of the Week. Consider the following game. A positive integer is chosen. Two players take turns in subtracting 1, 2, or 3 from the current integer (without going negative). The person who reaches zero is the winner. How to play well? What if the allowed subtractions are only 1 or 3? What if the allowed subtractions are 1, 2, or 4?