1. In a group of 240 people
   a) at least how many must have birthdays in the same month of any given year?
   b) at least how many must have birthdays falling in the same week of any given year?
   c) at least how many must have birthdays falling on the same day of the week in any given year?

2. There are 12 green balls, 10 blue balls, 13 red balls, 8 yellow balls and 9 black balls in a box. You reach into the box and pick balls without looking. How many balls must you take out to guarantee that you will have 5 of one color?

3. a) How many 5 digit numbers with distinct digits are there in which the digits are chosen from 1-9?
   b) how many of the numbers in (a) contain a 7 and a 2?
   c) in how many of the numbers in (a) do 7 and 2 appear consecutively (in either order, 27 or 72)?

4. There is a group of 8 men and 12 women.
   a) How many ways are there to choose a committee of 6 people?
   b) How many ways are there to choose a committee of 6 people consisting of 3 men and 3 women?
   c) How many ways are there to choose a committee of 6 people consisting of at least 2 women?
   d) How many ways are there to choose the committee of 6 people if John and Jane refuse to be on the same committee?

5. Your dinner table is round with 8 seats.
   a) how many ways are there to seat 8 people around the table?
   b) what if a certain couple insists on sitting next to each other at the table?

6. How many arrangements are there of the letters in the word MASSACHUSSETTS?

7. A certain store has 20 kinds of donuts. You would like to buy 15 donuts.
   a) how many choices do you have?
   b) how many choices do you have if you must get at least one chocolate donut?

8. Using the binomial theorem,
a) expand \((x + 2)^7\)
b) determine the fifth term in \((3x - y^2)^{13}\)
c) find the coefficient of \(x^{-6}\) in \((16x^2 - 2x^{-1})^{12}\)

9. Find the function in the list: 1, \(n\), \(n^2\), \(n^3\), \(n^4\), \(n\log n\), \(\log n\), \(n^n\), \(2^n\), \(n!\), \(\pi^n\) which has the same order as:

a) \(f(n) = 7n^3 - 8n^2 + 7\)
b) \(f(n) = 3n + 6n^n\)
c) \(f(n) = 2^n + 783n^4\)
d) \(f(n) = 67\)
e) \(f(n) = 4n! + \pi^n\)
f) \(f(n) = \frac{(4n^2 + 1)n \log n}{4n^3 + 2n}\)