1. How many ways are there to distribute five balls into three different boxes, labeled by A, B and C, if

   (a) the balls are different?

   (b) the balls are identical?

   (c) the balls are different and the following is satisfied: either box A is empty or box B is empty.

2. Suppose that x_1, x_2 and x_3 are non-negative integers.

   (a) How many solutions for $x_1 + x_2 = 10$?

   (b) How many solutions for $x_1 + x_2 = 10$, with $x_1 \geq 3$ and $x_2 \geq 4$?

   (c) How many solutions for $x_1 + x_2 + x_3 = 10$, with $1 \leq x_1 \leq 4$ and $2 \leq x_2 \leq 3$?

3. Let $S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$. Show that if six integers are chosen from S, then there must exist two chosen integers whose sum is 11.

4. Suppose $A = [m]$ and $B = [n]$. How many surjections are there from A to B?