FALL 2013 CS 112 HOMEWORK 1

1. There are 9 faculty members of the math department and 5 of the computer science department. How many ways are there to select a committee if the committee is to consist of 3 faculty members from the math department and 4 from the computer science department?

2. A team of 3 is to be chosen from a group of 3 boys and 4 girls. How many ways can this be done if
   a) There must be at least 1 boy?

   b) There must be at least 1 boy and at least 1 girl?

3. How many five digit positive integers that are divisible by 3 can be formed using the digits 0, 1, 2, 3, 4 and 5, without any of the digits getting repeated in a number?

4. In how many ways can 15 people be seated around two round tables with seating capacity of 7 and 8 people?

5. In how many ways can 3 boys and 3 girls be arranged in a row if
   a) The boys are together?

   b) The boys are separate?

6. There are 9 people standing in a line. If both Joe and Linda should neither be the first one nor the last one, how many valid ways are there to line them up?

7. Find the Laplace Transform of:

   1) $f(x) = e^{-x} + e^{x}$

   2) $f(x) = e^{ax}$

   3) $f(x) = x^{2}$

   4) $f(x) = 4x^{2} - 3x + 7$

8. Find the $z-\text{Transform}$ of:

1) $x(n)=(\frac{1}{2})^n, n\geq 0$

2) $x(n)=(\frac{1}{2})^n+(\frac{1}{3})^{-n}, n\geq 0$

3) $x(n)=n,\ \text{n}\geq 0$

4) $x(n)=\frac{1}{n},\ n\geq 1$

9. Solve the following differential equations (using Laplace Transform):

$$x(t)=\frac{dx(t)}{dt}+2\frac{d^2x(t)}{dt^2}$$

$$x(0)=1$$

$$x'(0)=\frac{1}{2}$$