Problem session November 16, SF2736, fall 10.

1. In how many ways can we choose a committee in a class consisting of 11 girls and 12 boys if

    (a) the committee shall consist of 4 girls and 4 boys.

    (b) the committee shall consist of 4 girls and 4 boys, but if the boy A is chosen to the committee then the girl B cannot attend.

2. In how many ways can we choose three groups of size 4 from a class consisting of 15 girls and 15 boys if we require that each group will contain at least one boy and one girl.

3. Find te number of ways we can form words of length 7 using the letters in the word DISKRET if no word may as subwords have the words RET, SIK or DIS.

4. Prove that
$$\binom{n}{r}\binom{r}{k} = \binom{n}{k}\binom{n-k}{r-k}.$$

5. Find the coefficient of x^{12} in the polynomial $(4 + 3x^2)^{10}$.

6. Find a formel for $S(n, 2)$.

7. Show that if $\gcd(n, m) = 1$ then $\phi(nm) = \phi(n)\phi(m)$

8. Find the number of positive integers d that divides the integer 129600.

9. Find the number of ways the set $\{1, 2, 3, \ldots, 8\}$ can be partitioned into four non empty subsets such that 1 and 2 will belong to different subsets.

10. Find the number of surjections f from the set $\{1, 2, 3, \ldots, 10\}$ to $\{1, 2, 3, \ldots, 6\}$ such that the elements $f(1)$, $f(2)$ and $f(3)$ are distinct elements.

11. Show that
$$\binom{m+n}{r} = \binom{m}{0}\binom{m}{r} + \binom{m}{1}\binom{m}{r-1} + \ldots + \binom{m}{r}\binom{m}{0}$$

12. Show that in any set of 10 people there are either four mutual friends or three mutual strangers.