MACM 101

Discrete Mathematics I

Date: September 21, 2011

1. Solution hints of Problem Set 3

   (a) Problems (Exercises 1.4) 2, 8, 16 18

      i. Problem 2: You need to consider when the youngest gets 1 and the youngest gets two candies separately. Here there are 5 types, and the number of objects to be distributed is 12. It is a case of combination with repetition.

      ii. Problem 4: It is equivalent to getting integral solution $x_1 + x_2 + x_3 = 8$ where $x_i \geq 1, i = 1, 2, 3$. Why?

      iii. Problem 16: C(n-1,n-19) is the answer for the first equation. Remember that the solutions are positive, ie, $x_i \geq 0$ for all i. C(n-1,n-64) is the solution for the second equation. You need to find n such that C(n-1,n-19) = C(n-1,n-64). Show that $n = 82$.

      iv. Problem 18: We need to find solutions that satisfy both the equations. Substituting the second equation to the first one, we get $x_4+x_5+x_6+x_7 = 37-6$. The answer is C(31+3-1,3-1).

   (b) Problems (Exercises 1.5) 2, 3, 4, 8, 10, 14, 20, 22

      i. Problem 2:(b) The order is important; each dial, except the first, has 4 choices. The first one has 5 choices.

      ii. Problem 3: Each intersection point is determined by two chords and each chord is determined by two points. Thus any 4 points determine an intersection point.

      iii. Problem 4: (b) Enumerate all possible breaks and solve for each one. Some of the cases: 4 from one and one from each of the other book; one from one book, two from a second one and the rest three from the thirs book There are 3! ways to order the books.

iv. Problem 8: We select two vowels,say OE, as one and remove I from the letters. There are 7!/2! permutations. We can now add I to each permutation in 5 different ways since I cannot be place to either side of 'OE'.

v. Problem 10: Observe that the last letter has to be R, the 18th alphabet. The first and the second initials must come from A through Q.

vi. Problem 14: (b) the answer is P(4,2)*10!. (c) total possible way (question(a)) - the number of ways H and T can be assigned to the same floor (questin(b)).

vii. Problem 20: There are C(n,r) ways to select r objects. Now each such r objects can be arranged around a circle in **(fill in) ways.

viii. Problem 22: Easy