MACM 101

Discrete Mathematics I
Date: September 21, 2011

1. Solution hints of ps1 and ps2
   (a) Problems (Exercises 1.1 and 1.2) 5, 23, 24, 31, 34, 36
      i. Problem 5: The first letter has two possibilities, the second letter has 2 possibilities, the first digit is 7, the last digit has two possibilities. The remaining two digits have 10 possiblities each.
      ii. Problem 23: The shooting sequence is clearly defined if an arrangement of the 12 objects are specified. For example: WWGBGBBRWRWR describes that first target was W, the second target was W, the third one is G, etc.
      iii. Problem 24: It is easier to go from the right to the left.
      iv. Problem 31: (iii) It should be clear that a six-digit number is divisible by 4 if the first two digit from the right is divisible by 4. For example xxxx32 is divisible by 4 irrespective of the values in xxxx. Determine the number of possible such two digits divisible by 4.
      v. Problem 34: Consider the cases separately. The possible cases are: no 7's; one 7 and one 3; one 7 and two 3's; two 7's, no 3 etc. For each such case we can compute the number of distinct 4-digit integers. For example for the case two 7's and no 3's: the number of such integers is 4!/2!.
      vi. Problem 36: In circular permutation of n objects, the number of such permutations is P(n,n)/n. In our case only half such permutations are equivalent. For case (b), take B away from the list. There are P(7,7) permutations. We then insert B making sure that it is not adjacent to A. The answer is 7200.
   (b) Problems (Exercises 1.3) 4, 8, 12, 17, 20, 22, 30
      i. Problem 4: (a) There are 2^6 possible arrangements. Each position is either raised or not raised.

ii. Problem 8: (g) Select three of a kind: C(4,3). There are 13 kinds. The remaining two cards must be different kinds: C(48,2) ways to draw 2 cards. But two of a same kind is not a valid combination. We need to subtract the number of ways to get a three of a kind and a pair. We need to subtarct the number obtained in (f).

iii. Problem 12: (a) C(12,3) ways to select 3 books for a child; C(9,3) ways to select for the second child, etc

iv. Problem 20: (b) Any four points out of 8 determine a quadrilateral (4 sides). This is combination without repetitions.

v. Problem 22: Use the rule of product. How many will have the term ag? The answer is 4.

vi. Problem 30: Should follow from Binomial Theorem for $(x + y)^n$ with the appropriate values for x and y.

2. Look at the problems at http://home.scarlet.be/ ping1339/Pcount.htm