CS 171
Homework Assignment 3h

Given: February 02, 2012 **Due:** February 07, 2012

This assignment is due by the end of the class on the due date. Unless all problems carry equal weight, the point value of each problem is shown in [ ]. To receive full credit all your answers should be carefully justified. Each solution must be the student's own work. Assistance should be sought or accepted only from the course staff. Any violation of this rule will be dealt with harshly.

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1. Answer each of the following questions. You don't need to show your work.

a. A bakery sells 6 different kinds of pastry. How many different dozens of pastry can you buy?

b. Answer the above question if you buy at least one of each kind?

c. Expand $(x + y)^6$ using the Binomial Theorem.

d. What is the coefficient of x^5y^{13} in the expansion of $(3x - 2y)^{18}$?

e. **True** or **False**? $3^n = \sum_{k=0}^{n} \binom{n}{k} 2^k$.

f. How many bit strings of length 10 contain an equal number of 0s and 1s?

2. Suppose that you are in Manhattan whose roads form a grid. Your position in the grid is given by (x, y), where x and y are integers. At any time, you may travel either north-bound (i.e., move from (x, y) to $(x, y + 1)$) or you may travel east-bound (i.e., move from (x, y) to $(x + 1, y)$). You start at the point $(0, 0)$ of the grid and your goal is to go to $(6, 6)$.
(a) How many different paths are there to go from $(0, 0)$ to $(6, 6)$?
(b) Suppose the point $(3, 4)$ is "blocked", i.e., you are not allowed to pass through the point $(3, 4)$. In how many ways can you go from $(0, 0)$ to $(6, 6)$ without passing through $(3, 4)$?

3. In how many ways can 12 indistinguishable apples and 1 orange be distributed among three children in such a way that each child gets at least one piece of fruit?

4. After a pretty successful life financially, you decide to give away your fortune to your five children. Your fortune amounts to $\$100,000,000$. You want to divide this amount in chunks of $\$1,000,000$ and give them to your children in such a way that every child gets at least $\$1,000,000$. Thus the amount that each child gets is a multiple of $1,000,000$. In how many ways can you distribute your wealth among your five children, provided each one receives at least $\$1,000,000$?

5. How many sets of three numbers each can be formed from the numbers $\{1, 2, \ldots, 20\}$ if no two consecutive numbers are to be in the same set?

6. How many 8-permutations are there of the 9 letters of the word `addresses`?