COMP 280 : Assignment 6

due: Thursday, March 2, 2000

1. (2 pts) How many ways are there to pick a combination of k things from $\{1, 2, \ldots, n\}$ if the elements 1 and 2 cannot both be picked?

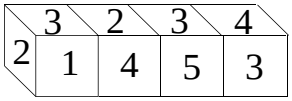
2. (2 pts) How many palindromes of length k can you form from a set of n distinct letters?

3. (3 pts) How many ways are there to put f different flags on p different flagpoles if the order of the flags on the flagpoles is important?

4. (3 pts) How many different bit strings can be transmitted if a string must begin with a 1 bit, must include three additional 1 bits (for a total of four 1 bits), must include a total of twelve 0 bits, and must have at least two 0 bits following each 1 bit?

5. (4 pts) A complete graph is one in which there is a (bi-directional) edge between every pair of distinct veritices (there are no reflexive edges). Given a complete graph G and two nodes n_1 and n_2 in G, how many distinct paths are there from n_1 to n_2 that do not include any node more than once? Explain your reasoning. (Note: two paths are distinct if they visit the nodes of the graph in different orders.)

6. (5 pts) You are given four cubes. Each side of each cube is labeled with a distinct number (from 1 through 6). Lining up the cubes end-to-end creates an arrangement of the cubes, as shown below:



Given an arrangement, we can read off the sequences of numbers along each of the four sides of the rectangle of cubes. For example, the arrangement above yields sequences 3234, 1453, plus the ones on the back and bottom sides of the cubes. Two arrangements are different if they produce a different set of sequences. How many different arrangements of the four cubes are possible?