

CSE21 Homework 3

Due: February 8, 2005

This is an **individual** homework assignment. Please answer all questions to the best of your ability, showing all work. **Please make sure that each problem is on a separate piece of paper, and that each piece of paper has your name and student ID number on it.**

1. Answer whether the following are true and prove your answer:
 - (a) $\sqrt[3]{n}$ is $O(\sqrt[4]{n} + \log(n))$
 - (b) $\sqrt[100]{n}$ is $O(\log n)$
 - (c) $\log^3 n$ is $O(\log n)$
 - (d) Let a, b be any positive integers.
 $(a + n)^b$ is $O(n^a)$
 - (e) $\lfloor \sqrt{n} \rfloor$ is $O(\sqrt{n})$.
2. A label has the following format: *Letter Letter Digit Digit Letter Letter*. (*Digit* is non-zero and we use capital *Letter* only.)
 - (a) How many different labels are there?
 - (b) How many different labels are there with distinct letters and digits?
 - (c) How many different labels begin with AB and have non-repeating (distinct) letters and digits?
 - (d) How many different labels have the letters A and B and have non-repeating (distinct) letters and digits?
3. There are 6 students named A,B,C,D,E,F respectively. Now they need to stand in a line. How many are the different ways to form the line
 - (a) if A is neither the first nor the last (6th) one.
 - (b) A and B are either the first or the last (6th) one.
 - (c) A and B must stand adjacent to each other.
 - (d) A and B must not stand adjacent to each other.
4. Here you go hiking with your friends. For communication purposes, each one get three flags with different colors: red, yellow and blue respectively. You want to use these flags as special signs. For example, if you raise the yellow flag at first, then the red flag, and finally the blue flag, it means "I need help". You can use one of the flags, two flags or three flags, with different sequences to represent different signs. How many different signs can be represented totally by these three flags?