CSE 321: Discrete Structures
Assignment #6
November 4, 2005
Due: Friday, November 18

Reading Assignment: Read Sections 4.1 - 4.4, and 5.1 - 5.2.

Problems (76 points, please justify your answers):

1. (4 points) Section 4.1, exercise 14.

2. (6 points) Section 4.1, exercise 42.

3. (6 points) Section 4.2, exercise 12.

4. (12 points) Section 4.3, exercise 20.

5. (8 points) How many ways can three distinct numbers be chosen from $1, 2, \ldots, 100$ such that their sum is even?

6. (18 points) An ice cream parlor has 28 different flavors, 8 different kinds of sauce, and 12 toppings.

   (a) In how many different ways can a dish of three scoops of ice cream be made where each flavor can be used more than once and the order of the scoops does not matter?

   (b) How many different kinds of small sundaes are there if a small sundae contains one scoop of ice cream, a sauce, and a topping?

   (c) How many different kinds of large sundaes are there if a large sundae contains three scoops of ice cream, where each flavor can be used more than once and the order of the scoops does not matter; two kinds of sauce, where each sauce can be used only once and the order of the sauces does not matter; and three toppings, where each topping can be used only once and the order ot toppings does not matter?

7. (4 points) What is the coefficient of $a^4 b^6$ in $(a^2 + b)^8$?

8. (6 points) Section 5.1, exercise 8.

9. (6 points) Section 5.1, exercise 20.

10. (6 points) Section 5.1, exercise 36.

11. **Extra credit:** (10 points) A dice is a cube with its faces labeled with numbers $1 \ldots 6$. Two dices are identical, if they are just like the same dice placed in a different orientation. How many different dice are there?

    Put differently: In how many different ways can we color a cube with six colors such that no two faces have the same color? Two colorings of the cube are the same, if it is not possible to distinguish between the two colorings.