CIS 185
Practice 12
Objective:

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- Be able to use counting techniques: permutations and combinations

Exercise 1: One hundred tickets, numbered 1, 2, 3, . . . , 100, are sold to 100 different people for a drawing. Four different prizes are awarded, including a grand prize (a trip to Tahiti).How many ways are there to award the prizes if

a) there are no restrictions?

$$P(100,4) = \frac{100!}{(100-4)!} = 94,109,400$$

b) the person holding ticket 47 wins one of the prizes?

$$P(99,3) = \frac{99!}{(99-3)!} = 941,094$$

c) the people holding tickets 19 and 47 both win prizes?

$$P(4,2) \cdot P(98,2) = \frac{4!}{2!} \cdot \frac{98!}{96!} = 114,072$$

d) the people holding tickets 19, 47, 73, and 97 all win prizes?

$$P(4,4) = \frac{4!}{0!} = 24$$

e) the grand prize winner is a person holding ticket 19, 47, 73, or 97?

$$P(4,1) = 4 \qquad 4 \cdot P(99,3) = 3,764,376$$

Exercise 2: A coin is flipped 10 times where each flip comes up either heads or tails. How many possible outcomes

a) are there in total?

$$2^{10} = 1024$$

b) contain exactly two heads?

$$C(10,2) = \frac{10!}{2!(10-2)!} = 45$$

c) contain at most three tails?

$$C(10,0) + C(10,1) + C(10,2) + C(10,3) = 1 + 10 + 45 + 120 = 176$$

d) contain the same number of heads and tails?

$$C(10,5) = \frac{10!}{5!(10-5)!} = 252$$