Counting: Fundamental Counting Principle

1. Evalute the following expressions without a calculator.

   (a) $\frac{5!}{4!}$ 5

   (b) $\frac{9!}{3!(9-3)!}$ 84

   (c) $\frac{12!}{8!4!}$ 495

   (d) $\frac{37!}{35!2!}$ 666

2. Find the number of distinguishable arrangements of the letters of each word or phrase.

   (a) BANANA 60

   (b) MISSISSIPPI 34650

   (c) JIGGLYPUFF 907200

3. After the rolling of the first ball of a frame in a game of 10-pin bowling, how many different pin configurations are possible? (Assume they are all physically possible.) 2^{10}

4. The zip code at UH Manoa is 96822. How many different ZIP codes can be formed using only these 5 digits? Many solutions due to poor wording.

5. Determine the number of ways to mark your answer sheet for each test.

   (a) A seven question true-or-false test. 2^7

   (b) A nine-question multiple choice test with 4 answer choices for each question. 4^9

6. Until 1995, the rules for three-digit area codes in the US were that the first digit could not be 0 or 1, the second digit had to be 0 or 1, and the third digit had no restrictions. How many area codes are possible? If the second restriction is removed, how many area codes are possible? 160,800