MATH 2610
Discrete Mathematics for Computer Science
Tuesday March, 22 2005

(1) An office building contains 27 floors and has 37 offices on each floor. How many offices are there in the building?

(2) A particular brand of shirt comes in 12 colours, has a male version and a female version, and comes in three sizes for each sex. How many different types of this shirt are made?

(3) There are four major auto routes from Boston to Detroit and six from Detroit to Los Angeles. How many major auto routes are there from Boston to Los Angeles via Detroit?

(4) How many different three-letter initials with none of the letters repeated can people have?

(5) How many bit strings are there of length eight?

(6) How many bit strings are there of length eight or less?

(7) How many bit strings of length n, where $n \in \mathbb{Z}^+$, start and end with 1s?

(8) How many strings are there of four lowercase letters that have the letter x in them?

(9) How many strings of four decimal digits (0,1,2,3,4,5,6,7,8,9)
    (a) do not contain the same digit twice?
    (b) do not contain the same digit *exactly* twice?
    (c) end with an even digit?
    (d) have exactly three digits that are 9s?

(10) How many different functions are there from a set with 10 elements to sets with the following numbers of elements?
    (a) 2
    (b) 3
    (c) 4
    (d) 5

(11) How many functions are there from the set $\{1, 2, 3, \ldots, n\}$, where $n \in \mathbb{Z}^+$, to the set $\{0, 1\}$?

(12) How many bit strings of length seven either begin with two 0s or end with three 1s?

(13) How many bit strings of length 10 contain either five consecutive 0s or five consecutive 1s?

(14) Use the product rule to show that there are 2^{2^n} different truth tables for propositions in n variables.