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5.1 Basic Counting Rules

CS 225

7th edition: { 8, 12, 16, 26, 28, 48, 52, 72}

8) 26 * 25 * 24 = 15,600 initials

12) $2^0 + 2^1 + 2^2 + 2^3 + 2^4 + 2^5 + 2^6 = 127$

16) case 1: 1 'x' in the string. 4*25*25*25 = 62500

case 2: 2 'x's in the string: 6*25*25 = 3750

case 3: 3 x's in the string: 4*25 = 100

case 4: 4 x's means there is only one string for that.

cases 1 +2 + 3 +4 = 66,351 combinations

26) a) 10*9*8*7 = 5040 distinct strings

b) $5 * 10^3 = 5000$ even ending strings

c) 9*4 = 36 choices

28) 10*10*10*26*26*26*2 = 35,152,000 license plates

48) case 1: two 0's start; $2^5 = 32$ ways

case 2: ends with three 1's; $2^4 = 16$ ways

case 3: starts two 0's ends with 3 1's: $2^2 = 4$

case 1 + 2 + 3 = 44

52) 38 + 23 - 7 = 54 students total

72) let P(m) be the product rule for m tasks.

basis: m = 2, P(2) is true. if there are n_1 ways to do the first task, and n_2 ways to do the second, then n_1n_2 ways possible exists for the procedure.

inductive step: P(k) is true for the inductive hypothesis, where k is an integer greater than 2. if k+1 tasks, T_1, T_2 ... T_{k+1} can be done in n_1,$n2_2$, ... n_{k+1} ways, so that it can be done separately. To finish all of these tasks, the first k tasks is (n_1n_2 .. n_k) * n_{k+1} to finish the entire tasks.