Clinton Hawkes
CS-225: Discrete Structures in CS
Homework 8 Part 2
Set 9.6, Problem# 4, 12, 18

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4.

a) $\binom{37}{30}$ $=$ $\dfrac{37\,!}{30\,!\,7\,!}$ $=$ $\dfrac{37*36*35*34*33*32*31}{7*6*5*4*3*2*1}$ $=$ $\dfrac{51889178880}{5040}$ $= 10,295,472$

b) $\binom{33}{26}$ $=$ $\dfrac{33\,!}{26\,!\,7\,!}$ $=$ $\dfrac{33*32*31*30*29*28*27}{7*6*5*4*3*2*1}$ $=$ $\dfrac{21531121920}{5040}$ $= 4,272,048$

c) We find this by subtracting the ways inventory can be distributed if at least four A76 batteries are included from the total ways the batteries can be distributed. So,

10,295,472 – 4,272,048 = 6,023,424

12.

There are 4 variables, so (4 - 1) is added on to the number of units to be divided, 30. So,

$\binom{33}{30}$ $=$ $\dfrac{33\,!}{30\,!\,3\,!}$ $=$ $\dfrac{33*32*31}{3*2*1}$ $=$ $\dfrac{332736}{6}$ $= 5456$ possible solutions

18.

a) $\binom{33}{30}$ $= 5456$, same math as question 12 above

b) $\binom{17}{14}$ $=$ $\dfrac{17\,!}{14\,!\,3\,!}$ $=$ $\dfrac{17*16*15}{3*2*1}$ $=$ $\dfrac{4080}{6}$ $= 680$ – this is the number of different collections there are if 16 or more quarters are chosen. So to get the number of collections possible with 15 or fewer quarters chosen, we subtract 680 from the total possible. 5456 – 680 = 4776

c) $\binom{12}{9}$ $=$ $\dfrac{12\,!}{9\,!\,3\,!}$ $=$ $\dfrac{12*11*10}{3*2*1}$ $=$ $\dfrac{1320}{6}$ $= 220$ – this is the number of different collections there are if 21 or more dimes are chosen. So to get the number of collections possible with 20 or fewer dimes chosen, we subtract 220 from the total possible. 5456 – 220 = 5236

d) If we want the number of collections possible with 20 or fewer dimes AND 15 or fewer quarters, we subtract our answers in b AND c from the total. So,

5456-(680+220) $=$ 5456 – 900 $=$ 4556