Set 9.6

4a)
30 batteries from 8 kinds
$(30 + 8 - 1 \quad 8 - 1) = (37 \quad 7)$
= 37! / 7! * 30!
= 10,295,472 ways

4b)
26 batteries from 8 kinds
$(26 + 8 - 1 \quad 8 - 1) = (33 \quad 7)$
= 33! / 7! * 26!
= 4,272,048 ways

4c)
33 batteries from 8 kinds
$(33 + 8 - 1 \quad 8 - 1) = (40 \quad 7)$
= 40! / 7! * 33!
= 18,643,560 ways

12)
$y_1 + y_2 + y_3 + y_4 = 30$ where $y_i >= 0$

$(30 + 4 - 1 \quad 30) = (33 \quad 30)$
= 33! / 30!(33-30)!
= 33! / 30! * 3!
= 33 * 32 * 31 / 3 * 2 * 1
= 32736 / 6
= 5,456

For problems 18 a - d LET:
x = pennies
y = nickels
z = dimes
w = quarters
Total number of coins = x + y + z + w

18a)
Total coins = 30, kinds = 4, bars = 4 - 1 = 3
30 stars and 3 bars
= $(30+3 \quad 3) = (33 \quad 3)$
= 33! / 30! * 3!
= 33 * 32 * 31 / 3 * 2 * 1
= 5,456

18b)
= $(33 \quad 3) - (18 \quad 3)$
= 5,456 - 816
= 4,640

18c)
$(33 \quad 3) - (13 \quad 3)$
= 5,456 - 286
= 5,170

18d)
{ $(18 \quad 3) + (13 \quad 3)$ }
= $(33 \quad 3) - \{ (18 \quad 3) + (13 \quad 3) \}$
= 5,456 - { 816 + 216 }
= 4,354