Homework #2, Math/Stat 511

§2.2, p. 82

#1 (ordered selection with replacement, distinguishable objects)

The multiplication principle is applied to give $\boxed{8^4}$ $= 4{,}096$

#3 (a) license plate $\boxed{\text{XX - \#\#\#\#}}$

(ordered selection with replacement of distinguishable objects)

Again, the multiplication principle gives

$$(26)^2(10)^4 = \boxed{6{,}760{,}000}$$

(b) $\boxed{\text{XXX - \#\#\#}}$ $\quad (26)^3(10)^3 = \boxed{17{,}576{,}000}$

#5 (a) without replacement, ordered sample

$n=4$

$r=4$

Multiplication principle $\Rightarrow 4 \cdot 3 \cdot 2 \cdot 1 = \boxed{4!}$ words

(b) with replacement, ordered sample $\Rightarrow 4 \cdot 4 \cdot 4 \cdot 4 = \boxed{4^4}$

#8 Count the mutually exclusive events (match ends in 3, 4, or 5 sets).

$$\underset{\text{selections for winner}}{2}\Big(\underbrace{1}_{3\text{ sets}} + \underbrace{\binom{3}{2}}_{4\text{ sets}} + \underbrace{\binom{4}{2}}_{5\text{ sets}} \Big) = 2(1+3+6) = \boxed{20}$$

remember the winner takes the last set, so # of ways to distribute 2 wins over $(n-1)$ sets

#11 All use the multiplication principle

(a) $\underset{B}{6} \cdot \underset{M}{4} \cdot \underset{C}{4} = \boxed{96}$

(b) $6 \cdot 4 \cdot 4 \cdot \underset{\text{garnishes}}{2^{12}} = \boxed{393{,}216}$ since

garnishes

1	2	3	...	12
Y/N	Y/N	Y/N		Y/N

(c) $(6)\left(\binom{4}{0}+\binom{4}{1}+\binom{4}{2}\right)\left(\binom{4}{0}+\binom{4}{1}+\binom{4}{2}\right) \cdot 2^{12} = \boxed{2{,}973{,}696}$

by the same principle