

# PROBABILITY REVIEW

## COMBINATORICS

### Permutations (Patterns)

- 1) 8 Cookies in a line  
Arrange all 8.  
 $8! = 40,320$

- 3) Have 15 cookies.  
Display 8 at a time.  
How many ways to arrange

$${}_{15}P_8 = ?$$

- 4) Boxed sets of 8 cookies.  
How many different boxed sets

$${}_{15}C_8$$

- 5) 2 of 4 different cookie shapes  
Display in a line with each pair together?

$$8 \cdot 1 \cdot 6 \cdot 1 \cdot 4 \cdot 1 \cdot 2 \cdot 1 = 384$$

Draw blanks  $\left\{ \begin{array}{l} \rightarrow \text{specific locations} \\ \rightarrow \text{repeated objects} \end{array} \right.$

### Combinations (Groups)

- 2) 3 Wreath Cookies,  
2 Stockings  
4 Santa faces

$$\frac{9!}{3!2!4!} = ?$$

look alike  
identical  
indistinguishable

$${}^6C_2 = \frac{6!}{4!2!}$$

$${}^6P_2 = \frac{6!}{4!} = \frac{6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{4 \cdot 3 \cdot 2 \cdot 1} = 30$$

COMBINATIONSNo Order  
No Repl.

Dependent events

All

CONDITIONAL PROB

Known fact

Draw tree.

$$P(G|B) = \frac{P(GB)}{P(B)}$$

Indiv Prob

Order

Repl.

Indep.

If any true

Binomial Prob

2 possible outcomes

Indep. events

Wording - repeat fraction triple

give prob.

Calculator

Menu - Prob -

Distributions

Binomial pdf = exact

Binomial cdf = at least at most

8 cookies - green ← 3 Wreaths

5 bells

6 cookies - red ← 4 wreaths

2 bells

Prob(2 green OR 2 bells)

OR = Add Check for duplicates!

$$\frac{{}^8C_2 + {}^7C_2 - {}^5C_2}{{}^{14}C_2}$$

4 green, 3 red, 2 blue

Prob(red, then blue, then red)

$$\frac{3}{9} \cdot \frac{2}{8} \cdot \frac{2}{7}$$

Look out for ODDS!

Expected Value - Make Chart  
-  $E.V. = (\text{gain/loss})(\text{prob.})$