

# MORE PROBABILITY

## Combinations

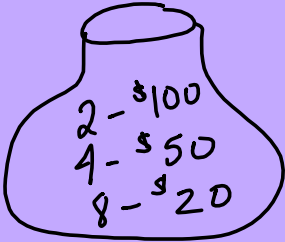
All must be true

- 1) No Replacement
- 2) No Order
- 3) Dependent Events -  
the 2nd event depends  
on the outcome of the  
1st event

## Individual Probabilities

If Any are true:

- 1) Replacement
- 2) Order
- 3) Independent Events -  
the 2nd event is  
not influenced by  
the outcome of the  
1st event  
flipping coins, rolling dice



Draw 3 + keep them.

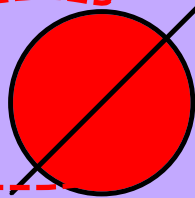
$$P(2 \text{ 100's} + 1 \text{ 50}) = \frac{{}^2C_2 \cdot {}^4C_1}{{}^{14}C_3} = \frac{1}{91}$$

- Combinations
- \*No replacement
  - \*No order
  - \*Dependent

$$\text{Prob}(\$20, \text{ then } \$100, \text{ then } \$20) = \frac{8}{14} \cdot \frac{2}{13} \cdot \frac{7}{12} = \frac{2}{89}$$

What NOT  
to do:

$$\frac{1}{8} \cdot \frac{1}{2} \cdot \frac{1}{7}$$



Pick 1 bill. Draw, put back, draw.  
Odds (\$20, replace, \$50)

$$\frac{8}{14} \cdot \frac{2}{14} = \frac{8}{49}$$

Odds =  $\frac{8}{41}$

- Combinations
- \*No replacement
  - \*No order
  - \*Dependent

Must do prob. first!

~~$\frac{8}{6} \cdot \frac{2}{10}$~~  cannot do individual odds

## Mutually Inclusive/Exclusive Events

Deck of cards - Draw 1 card

Prob(ace or black card)

$$\frac{4}{52} + \frac{26}{52} - \frac{2}{52} = \frac{28}{52} = \frac{7}{13}$$

OR  
= Add

Only with "OR" problems

Mutually Inclusive Events - Share common items

Mutually Exclusive Events - share No common items.

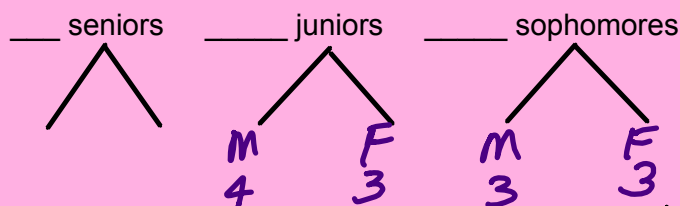
Draw 2 cards. Prob(<sup>2</sup>face cards OR <sup>2</sup>red)

Common items?

$$\frac{12C_2 + 26C_2 - 6C_2}{52C_2} = \frac{188}{663} \approx 0.284$$

Combinations  
\*No replacement  
\*No order  
\*Dependent

$$\text{odds} = \frac{188}{663-188} = \frac{188}{475}$$



Select 3 people to earn extra homework coupon.

Prob(3 juniors or 3 females)

Mut. Inclus.  
(duplicate terms)

$$\frac{{}_7C_3 + {}_6C_3 - {}_3C_3}{{}_{13}C_3} = \frac{35 + 20 - 1}{286} = \frac{54}{286} = \frac{27}{143}$$

Pick 5 students.

Prob (at least 3 males)

3M+2F OR 4M+1F OR 5M

$$\frac{\frac{7!}{4!3!} \cdot {}_7C_3 \cdot \frac{6!}{4!2!} + {}_7C_4 \cdot {}_6C_1 + {}_7C_5}{{}_{13}C_5}$$

$$= \frac{84}{143}$$

\* AT LEAST  
 \* AT MOST  
 \* No More Than  
 Write out all possibilities using OR.

