Homework Review - 13.3

⑱ $\quad _{10}C_8 = \dfrac{10!}{2!\,8!} = \dfrac{10 \cdot 9}{2} = 45 \quad (\text{combinations})$

⑰ $\quad _{10}P_3 = \dfrac{10!}{7!} = 10 \cdot 9 \cdot 8 = 720$

Millionaire   Airplane pilot   Guy who sits in
a vat of acid

(23)   6 main ingredients   8 toppings

pick 2   pick 3

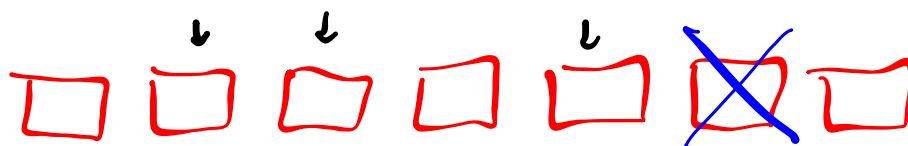$$_6C_2 = \frac{6!}{4!\,2!} = \frac{6 \cdot 5}{2} = 15$$

$$_8C_3 = \frac{8!}{5!\,3!} = \frac{8 \cdot 7 \cdot 6}{3 \cdot 2} = 56$$

$$\begin{array}{r} \overset{3}{56} \\ 15 \\ \hline 280 \\ 56 \\ \hline 840 \end{array}$$
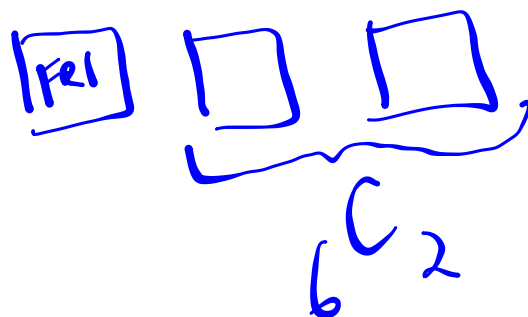
840 different combos

㉔

$$P = \frac{\text{\# ways I can work a Friday}}{\text{\# of 3 day shifts}}$$

$$_7C_3 = \frac{7!}{4!\,3!} = \frac{7 \cdot 6 \cdot 5}{3 \cdot 2} = 35$$

$$\frac{15}{35} = \boxed{\frac{3}{7}}$$

FRI

$$_6C_2$$

$$_6C_2 = \frac{6!}{4!\,2!} = \frac{3 \cdot 6 \cdot 5}{2} = 15$$

Finding Compound Probabilities:

A or B (Drop my pen or drop my hat)

What is a compound probability?

A and B (eat a pizza and drink a soda)

How do we find the number of possible outcomes?

If one thing happens, the other can't

- mutually exclusive events

(take a train or take a plane)

- overlapping events

Potentially both can happen

(take a plane or sit by a window)

Counting Mutually Exclusive Events

$$P = \frac{\text{\# of ways the event can occur}}{\text{\# of possible outcomes}}$$

[3] = 1

How many ways can one event happen? (roll a 3)

[2] [4] [6] = 3

How many ways can the other event happen? (even #)

1 + 3 = 4 ways
to roll a 3
or get an even #

Add them together ...

Example: Roll a 3 or an even #

Counting Overlapping Events

(How many ways can A or B happen)

$\boxed{1}$ $\boxed{3}$ $\boxed{5}$ $= 3$

$\boxed{1}$ $\boxed{2}$ $\boxed{3}$ $\boxed{5}$ $= 3$

(2 overlaps)

$3 + 3 - 2 = 4$ ways
to roll an
odd # or
a prime #

How many ways can one event happen?
(odd #)

How many ways can the other event happen? (prime #)

Add together and subtract the number of ways BOTH events can happen ...

Example: Roll an odd # or a prime #

Finding the Probability of A or B: $P = \dfrac{\text{\# event occur}}{\text{Sample space}}$

$P(A \text{ or } B)$

4

How many ways can the condition be met (mutually exclusive or overlapping...)?

6

How many total outcomes are there?

$P(\text{Roll a 2 or Roll an odd \#}) =$

Use the probability formula.

$\dfrac{4}{6} = \dfrac{2}{3}$

Example: Roll a 2 or an odd #

$4 = 2 \qquad 1,3,5$

In Exercises 1–4, you draw a card from a bag that contains 4 yellow cards numbered 1–4 and 5 blue cards numbered 1–5. Tell whether the events A and B are *mutually exclusive* or *overlapping*. Then find P(A *or* B).

1. **Event A:** You choose a card with an even number. *Y2, Y4, B2, B4*
   Event B: You choose a number 4 card. *Y4 B4*

2. **Event A:** You choose a yellow card.
   Event B: You choose a number 5 card.

3. **Event A:** You choose a blue number 3 card. *B3*
   Event B: You choose a blue card. *B1 B2 B3 B4 B5*

4. **Event A:** You choose a card with an odd number. *B1 B3 B5 Y1 Y3*
   Event B: You choose a blue card. *B1 B2 B3 B4 B5*

Y1 Y2 Y3 Y4 B1 B2 B3 B4 B5

10 - 3 = 7

① Mutually exc. or overlapping?

② # ways event occur?

③ Probability of A or B

	1	2	3	4
	Ov.	M	Ov.	Ov.
#	4	5	5	7
P	$\frac{4}{9}$	$\frac{5}{9}$	$\frac{5}{9}$	$\frac{7}{9}$

Independent vs. Dependent Events

5 red, 2 green
marbles in a bag

Independent event: one event has no effect on whether the other is likely to happen
 ex. pick a marble & replace; pick another marble

Dependent event: one event CHANGES how likely another is to occur
 ex. pick a marble; don't replace; pick another marble

Finding the Probability of A and B:

Are the events independent or dependent?

Independent:
P(A and B) = P(A) * P(B)

Dependent:
P(A and B) = P(A) * P(B given A)

Example - 5 green, 2 red marbles in a bag!

A bag contains 6 red balls and 5 green balls. You randomly draw one ball, replace it, and randomly draw a second ball.

Event A: The first ball is green.

Event B: The second ball is green.

You write each of the letters of the word BRILLIANT on pieces of paper and place them in a bag. You randomly draw one letter, do not replace it, then randomly draw a second letter.

Event A: The first letter is an L.

Event B: The second letter is a T.

Homework:

p. 864, 2-20 even, 23, 24

pt 1: 2-6 even
        14
        18
        24b