

10.1 Notes Day 1

Wednesday, December 2, 2015
11:00 AM
Precalculus

Section 10.1 Notes – Day 1

Probability

Warm-up: What do you already know about probability? Find the probability of:

- a. Tossing a "head" on a single toss of a fair coin.

$$\frac{1}{2} \quad 50\%$$

- b. Tossing two "heads" in a row on two tosses of a fair coin.

$$\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4} \quad 25\%$$

- c. Drawing a queen from a standard deck of 52 playing cards.

$$\frac{4}{52} = \frac{1}{13}$$

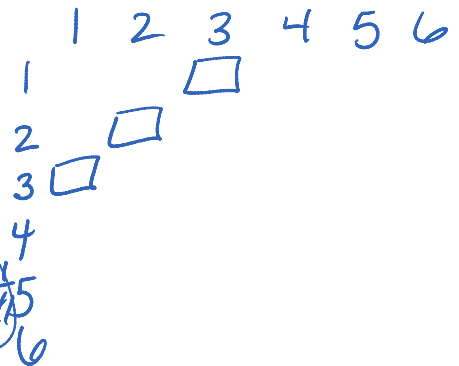
- d. Rolling a sum of 4 on a single roll of two, fair, six-sided dice.

$$\frac{3}{36} = \frac{1}{12}$$

- e. Guessing correctly all 6 numbers in a lottery with 46 numbered balls?

$$\frac{1}{9,366,819}$$

$$\frac{1}{46C6} = \frac{6!}{46!} \cdot \frac{1}{46} \cdot \frac{1}{45} \cdot \frac{1}{44} \cdot \frac{1}{43} \cdot \frac{1}{42} \cdot \frac{1}{41}$$



Probability Vocabulary:

Sample Space: set of all possible outcomes = S

Event space: set of all possible "winners" = E

Probability of an event: $P(E) = \frac{E}{S} = \frac{\text{winners}}{\text{total}}$

Probability functions and distributions: table or function that assigns probabilities to each outcome

Multiplication Principle of Probability: $P(\text{Both A and B occur}) = P(A) \cdot P(B)$
and - multiply
or - add

Examples:

1. Charlotte loves Jelly Beans, except for black licorice! The table below illustrates the overall flavor proportions in a particular Jelly Bean company's mix.

Flavor	Green Apple	Strawberry Red	Bunny Blue Raspberry	Purple Grape	Black Licorice
Proportion	0.25	0.3	0.2	0.1	0.15

Is this a valid probability distribution? *yes - adds to 1.0*

If Charlotte picks a Jelly Bean at random, what is the probability that it is:

a. Green Apple *or* Bunny Blue Raspberry?

$$.25 + .2 = .45$$

b. Neither Red nor Purple?

$$.25 + .2 + .15 = .6$$

OR

c. Not black licorice?

$$1 - .15 = .85$$

$$1 - (.3 + .1) = .6$$

2. In Mrs. DiMarco's version of Three Card Poker, she uses only 26 cards – 13 black Spades and 13 red Hearts. In a given three card hand that is dealt, what is the probability that the hand consists of:

a. All hearts?

$$P(\text{all hearts}) = \frac{{}^{13}C_3}{{}^{26}C_3} = \frac{286}{2600} = .11$$

OR

$$\frac{13}{26} \cdot \frac{12}{25} \cdot \frac{11}{24} = .11$$

b. All spades?

$$.11$$

c. All face cards (J, Q, K)?

$$\frac{{}^6C_3}{{}^{26}C_3} = \frac{20}{2600} = .0077$$

OR

$$\frac{6}{26} \cdot \frac{5}{25} \cdot \frac{4}{24} = .0077$$

d. All Aces?

$$2C_3 \text{ No!}$$

e. 2 hearts and 1 spade?

$$\frac{{}^{13}C_2 \cdot {}^{13}C_1}{{}^{26}C_3} = \frac{78 \cdot 13}{2600} = .39$$

