

10.1 Day 1 (Thursday 1/23)

Wednesday, January 22, 2020 10:38 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.

$$\frac{1}{2} = 0.5$$

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

$$\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$$

- 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 (order doesn't matter).

$$\frac{1}{46C6}$$

Probability Vocabulary:

Sample Space:

The set of all possible outcomes = S

Probability of an event:

$$P(E) = \frac{\# \text{ outcomes in } E}{\# \text{ outcomes in } S}$$

event occurring = \bar{E}

n not
 $P(\text{not green})$

Probability functions and distributions:

table or function that assigns probabilities to each outcome

Multiplication Principle of Probability:

$$P(\text{Both } A \text{ and } B) = P(A \text{ and } B) = P(A) \cdot P(B)$$

Examples:

1. Kate 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 because . adds to 1

If Kate 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?

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

$$1 - .4 = .60$$

c. Not black licorice?

$$1 - .15 = .85$$

2. A pair of dice is rolled, one black and one white. Find the probability of each of the following events:

a. The total is ten.

	Black	1	2	3	4	5	6
White	1						
2							
3							
4							
5							
6							

b. The total is at least ten.

c. The total is between 3 and 7, inclusive.

3. In Ms. Orloff'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?

$$\frac{13C_3}{26C_3}$$

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

$$\frac{6C_3}{26C_3}$$

e. All aces?

$$0$$

b. All spades?

$$\frac{13C_3}{26C_3}$$

d. No face cards?

f. 2 hearts and 1 spade?

$$\frac{13C_2 \cdot 13C_1}{26C_3}$$

$$S = 26C_3$$

Problems to try.....

1. In your sock drawer you have 12 loose socks, 8 black and 4 blue.

a. If you choose 2 at random, what is the probability of at least one blue?

b. If you choose 2 at random, what is the probability of a pair?

c. If you choose 1 at random, what is the probability you chose the one with a hole in it?

Your teacher is forming a committee of 5 from 28 students (12 girls and 16 boys).

a. What is the probability the committee will have all boys or all girls?

$$\frac{16C_5 + 12C_5}{28C_5}$$

b. What is the probability the committee will have at least one girl?

$$1 - \frac{16C_5 \cdot 12C_0}{28C_5}$$

1 - none = at least one

c. What is the probability that Jamie and Ray are on the committee?

$$\frac{2C_2 \cdot 26C_3}{28C_5}$$

d. What is the probability the committee will have no more than 2 boys?

$$\frac{2b3g \text{ or } 1b4g \text{ or } 0b5g}{28C_5}$$
$$\frac{16C_2 \cdot 12C_3 + 16C_1 \cdot 12C_4 + 16C_0 \cdot 12C_5}{28C_5}$$