

Foundations 12 – Introduction to Probability Part 2

Homework: Lesson #2 on Pg. 133: #1-15

Ex 1

Consider Ex 3 from last time. Using the sample space in the table determine:

- a) the probability that the sum of the dice is bigger than 8.

$$\frac{10 \text{ combinations bigger than } 8}{36 \text{ total options}} = \frac{10}{36} = \frac{5}{18} = 0.278 = 27.8\%$$

- b) the probability that the sum of the dice is not bigger than 8. (There are two ways to do this. Find both!)

$$\frac{36 - 10 \text{ not bigger than } 8}{36 \text{ total}} = \frac{26}{36} = \frac{13}{18} = 72.2\% / 100\% - 27.8\% = 72.2\%$$

Another way we can express the chance of something happening is through **Odds**.

The "Odds for" or "Odds in favor of" the sum being bigger than 8 are: $10:26$ or $5:13$

The "Odds against" the sum being bigger than 8 are: $26:10$ or $13:5$

If you have **Even odds**, that means the odds for and against are equal: $1:1$ or $50:50$.

The means the probability would be equal for either outcome.

Odds are different from probability and it can get a little tricky when you go between Odds and Probability.

Odds in favor of something \Rightarrow # of favorable : # not favorable

Odds against something \Rightarrow # of not favorable : # of favorable

Probability of something $\Rightarrow \frac{\text{\# of favorable}}{\text{total}} = \frac{\text{\# of favorable}}{\text{\# of favorable} + \text{\# of unfavorable}}$

- c) find the odds for and odds against the sum of the dice being bigger than 10 (in lowest terms)

3 favorable \rightarrow 36-3 unfavorable
33 unfavorable

odds for

$$3:33 \Rightarrow 1:11$$

odds against

$$33:3 \Rightarrow 11:1$$

Ex 2

The probability it will rain tomorrow is 0.65. What are the odds against it raining tomorrow?

Odds against

unfavorable : # favorable

$$35 : 65 \div 5$$

$$| 7 : 13 |$$

$$P = \frac{\# \text{ favorable}}{\text{total}} = \frac{65}{100}$$

$$\# \text{ unfavorable} = 100 - 65 = 35$$

Ex 3

The odds in favor of winning a stuffed animal at a raffle are 2:75 and the odds in favor of winning a jar of jellybeans is 2:105.

a) Which prize are you more likely to win? How do you know?

Odds in favor

favorable : # unfavorable

Animal 2 : 75 ← less unfavorable

Jelly Beans 2 : 105

b) Find the probability of winning each prize.

$$P = \frac{\# \text{ favorable}}{\text{total}} = \frac{2}{2+75} = \frac{2}{77} = 0.02597 = \underline{2.6\%}$$

Jelly Beans

$$\frac{2}{2+105} = \frac{2}{107} = 0.019 = \underline{1.9\%}$$

a) the sum of the dice is bigger than 5

D4, D6

$$\frac{14 \text{ favorable}}{24 \text{ total}} = 58\%$$

odds for

14:10

7:5

odds Against

10:14

5:7

b) the sum of the dice is less than 5

$$\frac{6 \text{ favorable}}{24 \text{ total}} = 25\%$$

6:18

1:3

18:6

3:1

c) explain why a) and b) are **not** complementary events

← opposite

$$25\% + 58\% \neq 100\%$$

NOT including {equal to 5}

d) Roll the pair of dice 10 times, add up the numbers and record the results. Do the results exactly match the probabilities you calculated in a) and b)? Why or why not?

Theoretical vs. Practical
Calculations experiments

more experiments \Rightarrow theoretical and practical results become closer