Comparing Probability and Odds

$$\text{Probability of an event} = \frac{\text{\# of desired outcomes}}{\text{total \# of possible outcomes}}$$

Another way to think about probability is in terms of odds.

Odds – a ratio that compares the # of **possible successful outcomes** to the # of **possible unsuccessful outcomes**

must be ratio form

successful : unsuccessful

- Odds in favour of an event occurring
- Odds against an event occurring

odds in favour = # of ways can occur (successful) : # of ways event cannot occur (unsuccessful)

odds against = # of ways can't occur (unsuccessful) : # of ways can occur (successful)

* add up to total # of events

Example 1

A six-sided die is rolled. Determine:

a) The probability of rolling a 4

$P(4) = \frac{\text{\# of ways can occur}}{\text{total poss outcomes}} = \frac{1}{6}$

b) The odds in favour of rolling a 4

1 + 5 : 6 possible outcomes

odds in favour = 1 : 5 ← unsuccessful

↑ successful

c) The odds against rolling a 4

odds against = 5 : 1 ← successful

↑ unsuccessful

Example 2 – Your Turn!!!

A wallet contains 3 - $5.00 bills, 2 - $10.00 bills, and 1 - $20.00 bill. What are the odds against drawing out a $10.00 bill?

6 possible outcomes

Odds against = 4 : 2 ← pick $10

↑ pick $5 or $20

3 + 1

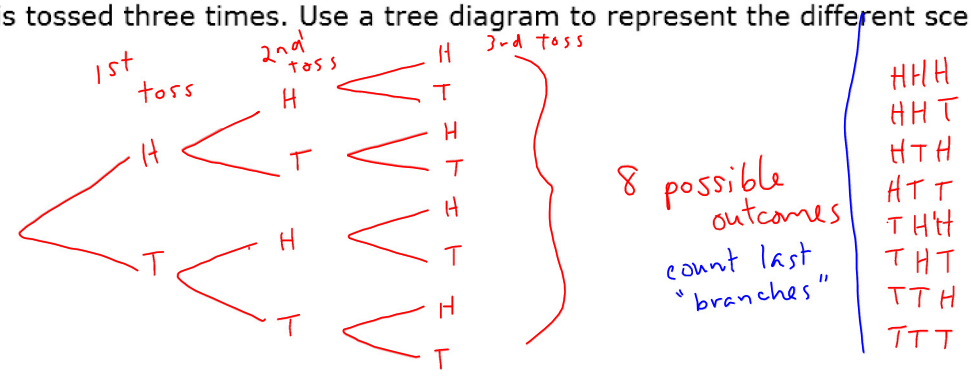
or 2 : 1

Tree Diagram

- A type of organizer for displaying outcomes of an event.
- Each branch represents a different possible outcome.

Example 3

A coin is tossed three times. Use a tree diagram to represent the different scenarios.



a) Determine the probability of three tosses all landing heads.

$P(HHH) = \frac{1}{8}$

b) Determine the odds for three tosses all landing heads.

Odds in favour = 1 : 7

add up total outcomes

c) Determine the odds against three tosses all landing heads.

Odds against : 7 : 1

Example 4

The odds in favour of an event occurring is 5:2, determine the probability of the event occurring.

5 : 2

ways event can occur

ways event cannot occur

$P(\text{event}) = \frac{5}{7}$

∴ total ways = 7