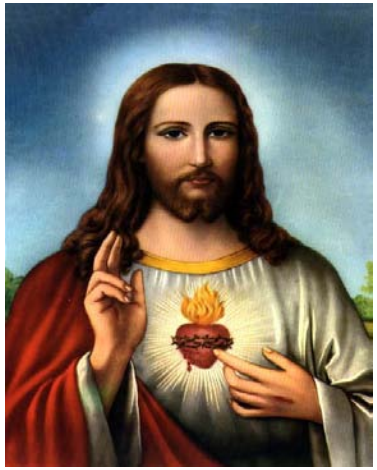
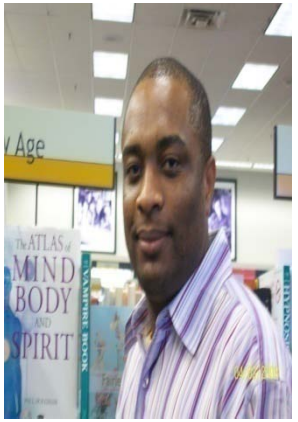


Probability



What is the probability that Christ will come again to judge all mankind?

Vocabulary Words

- Definition of Probability
  - *English definition*
  - *Math definition*
- Inequality range for Probability
- Sample space (S)
- Event space (E)
- Random Experiment
- Outcome
- Success
- Failure
- Calculation of Sample Spaces : Cases of coins, dice, marbles, spinners, boxes, and so on.

Vocabulary Words (Contd.)

- ❖ Probability (relation of math, art and science)
  - ➢ *Tree Diagrams*
  - ➢ *Punnett Squares*
- ❖ Events
  - ➢ *Dependent Events*
  - ➢ *Independent Events*
  - ➢ *Mutually Exclusive Events*
  - ➢ *Complementary or Prime Events*
- ❖ Conditions of Probability
  - ➢ *"With replacement" condition*
  - ➢ *"Without replacement" condition*
- ❑ Pre-Algebra Project in Probability (Major Grade)

Probability

- ✓ Probability is defined as the likelihood of an event to occur OR
- as the measure of the success or certainty of an event.
- In mathematics, the probability of an event is denoted by P(E) and is defined as
- $P(E) = \frac{\text{number of required outcomes}}{\text{number of possible outcomes}} = \frac{n(E)}{n(S)}$

- It is also defined as
- P(E) = number of elements in the event space

  number of elements in the sample space

$$P(E) = \frac{n(E)}{n(S)}$$

✓ Sample Space: is denoted by S. It is defined as the number of possible outcomes of a random experiment.

Inequality Range for Probability

✓ Probability satisfies the inequality:

$0 \leq P(E) \leq 1$

This means that:

- The probability of any event lies between 0 and 1.
- The probability of an impossible event is 0.

  For example, the probability of finding a pregnant man in the world is 0.
- The probability of an event that must occur is 1. For example, the probability that Christ will come again to judge all mankind is 1.

- ✓ Event Space: is denoted by E. It is defined as the subset of the sample space which is also a collection of the outcomes (required outcomes) of a random experiment.
- ✓ Random Experiment: is defined as an experiment whose results cannot be predicted. Examples are the:

- toss of a fair coin
- toss of a fair die, and so on.

- ✓ Outcome is defined as the result of a random experiment.
- ✓ Success is defined as a positive outcome or positive result
- ✓ Failure is defined as a negative outcome or negative result.
- ❑ Let's reason. If we assume that the head of a coin is a success whenever a coin is tossed, then that the tail is a failure and vice versa.

Calculation of Sample Spaces

✓ Calculate the sample spaces for these events:

- Toss of a fair coin (a fair coin tossed one time)
- Toss of two fair coins or two tosses of a fair coin (two fair coins tossed one time or a fair coin tossed two times)
- Toss of three fair coins or a three tosses of a fair coin (three fair coins tossed one time or a fair coin tossed three times)
- Toss of four fair coins or a four tossed of a fair coin (four fair coins tossed one time or a fair coin tossed four times)

- Toss of a fair die one time
- Toss of two fair dice or two tosses of a fair die (Two fair dice tossed one time or a fair die tossed two times)
- What do you notice in your results so far?
- Can you give the formula for calculating the number of elements in the sample space for tosses of coins and dice?
- Do that as your homework. See you next time.

Always Note

- The probability of any event must lie between 0 and 1.
- Probability can be expressed as a fraction, decimal or percentage.
- Some textbooks , stations, etc refer to “probability” as “chance”. For example: Your APR (Alabama Public Radio) station might say that Montgomery will have a 50% chance of snow. This means that the probability that it will snow in Montgomery is 0.5 or ½. So, probability and chance mean the same thing.
- For all probability calculations, make sure that you get the cardinality of the sample space (number of elements in the sample space), n(S); n(E) and compute n(E) / n(S).

Let’s do some calculations

- Question 1:
- Ester tossed a coin. Calculate the probability that she got

(a.) a head

(b.) a tail

(c.) no head

(d.) two tails

(e.) a head or a tail

Question 2

- Amber tossed a coin twice. Find the probability that these will appear:

  (a.) all heads

  (b.) no head

  (c.) at least one tail

  (d.) at most two tails

  (e.) three heads

Question 3

- Kimontrice picked up a die and tossed it. Find the chance that she had a

  (a.) an even

  (b.) a prime

  (c.) a perfect square

  (d.) a perfect cube

  (e.) a two

  (f.) no even

  Did you notice anything form your answers in (a.) and (f.) What did you notice?

Question 4 (Homework)

- Natoya tossed two dice one time. Find the probability that she got
  - (a.) a prime and an odd
  - (b.) a prime and an even
  - (c.) equal numbers
  - (d.) a sum of at least 8
  - (e.) a sum of at most 12
  - (f.) a perfect square and a perfect cube

Ask your Questions

- Okay, let's look at some ARMT problems. Before that, take note of this formula and put it in your brain. (n (S) = F^T))
- Where n(S) = number of elements in the sample space
- F = number of faces (as in a coin or a die)
- T = number of tosses or throws

Watch out for part 2 of this lesson. Have a nice day.