

## Quiz #1 : Week 1 - Practice Quiz

### Question 1

1. Suppose you flip a coin twice and observe the result. Which set below describes the **sample space** of this experiment? I.e., which set describes every possible outcome? Define:  $H$  as heads and  $T$  as tails.

- ☐  $\{H, T\}$
- ☐  $\{(H, T), (T, H)\}$
- ☐  $\{(H, H), (T, T)\}$
- ☒  $\{(H, T), (H, H), (T, H), (T, T)\}$

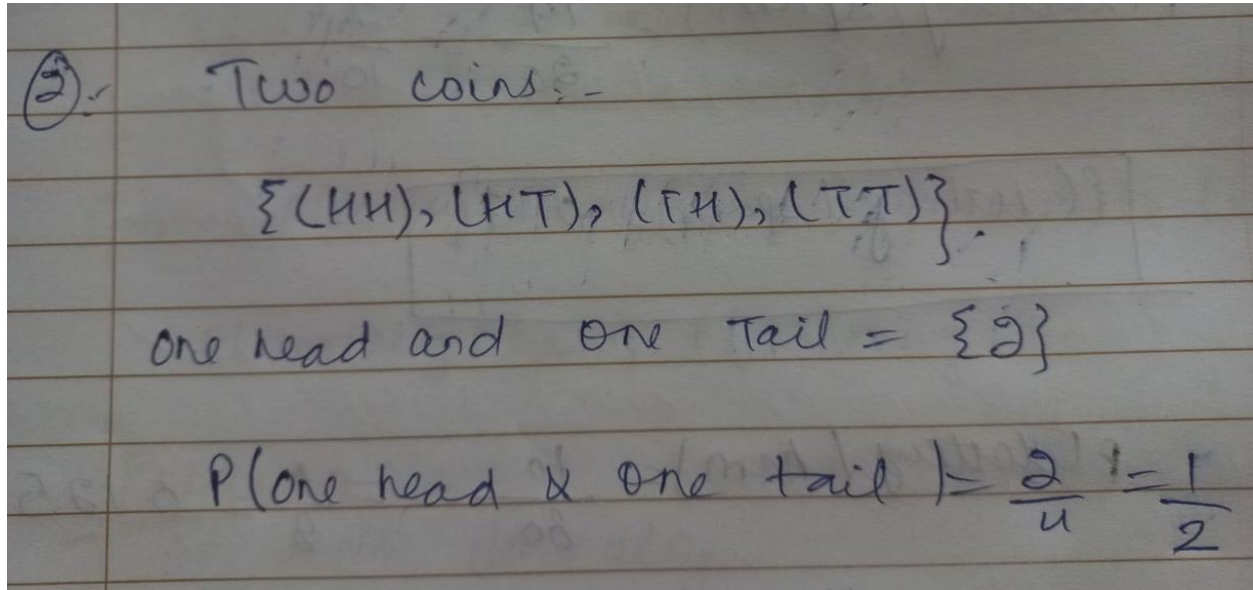
Answer:- d

### Question 2

2. Let's keep the same experiment: flipping a coin twice. What is the probability of obtaining one head and one tail in this experiment (the order doesn't matter)?

 $\frac{1}{2}$  $\frac{3}{4}$  $\frac{1}{4}$

Answer:- a



### Question 3

3. Consider the following experiment:

You throw a dice 10 times and sum the results. What is the probability of getting a number higher than 10?

Hint: Use the complement rule!

- ☐  $\frac{5}{6}$
- ☒  $\frac{6^{10} - 1}{6^{10}}$
- ☐  $\frac{1}{6}$
- ☐  $\frac{1}{6^{10}}$

Answer:- b

(3):- dice 2 times =  $6 = 36$   
dice 10 times =  $6^{10} = 60466176$

for one dice the probability that sum is higher than 10 is  $\frac{1-1}{6^{10}}$

$\{1, 2, 3, 4, 5, 6, 7, 8\}$   
 $\{1, 1, 1, 1, 1, 1, 1, 1, 1, 1\}$  ---

This will be the only entry in sample space which will produce the sum = 10, all other entries will produce sum > 10.

So  $P(\text{sum less than or equal to 10}) = 1/6^{10}$

By complement rule, -

$$P_{\text{req}} = 1 - \frac{1}{6^{10}} = \frac{6^{10} - 1}{6^{10}}$$

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Question 4

4. If you throw a dice twice and sum the result, what is the probability of getting a 10?

- ☐  $\frac{1}{36}$
- ☒  $\frac{1}{12}$
- ☐  $\frac{1}{18}$
- ☐  $\frac{1}{9}$

Answer:- b

④. Sample space =  $\{(1,1), (1,2), (1,3), (1,4), (1,5), (1,6), (2,1), (2,2), (2,3), (2,4), (2,5), (2,6), (3,1), (3,2), (3,3), (3,4), (3,5), (3,6), (4,1), (4,2), (4,3), (4,4), (4,5), (4,6), (5,1), (5,2), (5,3), (5,4), (5,5), (5,6), (6,1), (6,2), (6,3), (6,4), (6,5), (6,6)\}$ .

Probability of getting sum = 10 ?

$\{(4,6), (6,4), (5,5)\}$ .

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

### Question 5

5. Consider the following problem:

In an experiment there are 100 ill persons. 50 of them have headache and 50 of them have fever.

The researchers want to find the probability of a random selected person in this experiment having headache or fever. One researcher provides the following argument:

"Since 50 out of 100 have headache, the probability of having headache is  $1/2$ . The same reasoning can be applied to having fever. Therefore, the probability that a random selected person has either fever or headache is 1."

About their argument, choose the correct option.

- ☐ It is incorrect, because it assumes that the events of having headache and fever are **disjoint**. This cannot be inferred by the experiment as it is stated.
- ☐ It is correct, because in this case it is an application of the sum of probabilities.
- ☐ It is incorrect, because instead of summing up the probabilities, the researcher should have multiplied it.
- ☐ It is correct, because the sum of persons with headache and with fever is exactly 100.

☒ **Correct**

Correct! There is nothing in the experiment saying that the events are disjoint, so it may be the case where some persons have headache AND fever, and by just summing the values altogether, you are summing these cases twice!

**Answer:- a**

⑤ 100 ill persons:-  
→ 50 → headache  
→ 50 → fever

$P(A \cup B) = \frac{1}{2} + \frac{1}{2} = 1$  if events A and B are disjoint.

It is correct b/c it is not mentioned that event A and B are disjoint events.