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EXERCISE 16.1 - Question No. 1

Describe the sample space for the indicated experiment : A coin is tossed three times.

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EXERCISE 16.1 - Question No. 2

Describe the sample space for the indicated experiment : A die is thrown two times.

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EXERCISE 16.1 - Question No. 3

Describe the sample space for the indicated experiment : A coin is tossed four times.

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EXERCISE 16.1 - Question No. 4

Describe the sample space for the indicated experiment : A coin is tossed and a die is thrown.

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EXERCISE 16.1 - Question No. 5

Describe the sample space for the indicated experiment : A coin is tossed and then a die is rolled only in case a head is shown on the coin.

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EXERCISE 16.1 - Question No. 6

Describe the sample space for the indicated experiment : 2 boys and 2 girls are in Room X, and 1 boy and 3 girls in Room Y. Specify the sample space for the experiment in which a room is selected and then a person.

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EXERCISE 16.1 - Question No. 7

Describe the sample space for the indicated experiment : One die of red colour, one of white colour and one of blue colour are placed in a bag. One die is selected at random and rolled, its colour and the number on its uppermost face is noted. Describe the sample space.

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EXERCISE 16.1 - Question No. 8

An experiment consists of recording boy-girl composition of families with 2 children. (i) What is the sample space if we are interested in knowing whether it is a boy or girl in the order of their births? (ii) What is the sample space if we are interested in the number of girls in the family?

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EXERCISE 16.1 - Question No. 9

A box contains 1 red and 3 identical white balls. Two balls are drawn at random in succession without replacement. Write the sample space for this experiment.

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EXERCISE 16.1 - Question No. 10

An experiment consists of tossing a coin and then throwing it second time if a head occurs. If a tail occurs on the first toss, then a die is rolled once. Find the sample space.

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EXERCISE 16.1 - Question No. 11

Suppose 3 bulbs are selected at random from a lot. Each bulb is tested and classified as defective (D) or non defective (N). Write the sample space of this experiment.

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EXERCISE 16.1 - Question No. 12

A coin is tossed. If the outcome is a head, a die is thrown. If the die shows up an even number, the die is thrown again. What is the sample space for the experiment?

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EXERCISE 16.1 - Question No. 13

The numbers 1, 2, 3 and 4 are written separately on four slips of paper.

The slips are put in a box and mixed thoroughly. A person draws two slips from the box, one after the other, without replacement. Describe the sample space for the experiment.

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EXERCISE 16.1 - Question No. 14

An experiment consists of rolling a die and then tossing a coin once if the number on the die is even. If the number on the die is odd, the coin is tossed twice. Write the sample space for this experiment.

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EXERCISE 16.1 - Question No. 15

A coin is tossed. If it shows a tail, we draw a ball from a box which contains 2 red and 3 black balls. If it shows head, we throw a die. Find the sample space for this experiment.

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EXERCISE 16.1 - Question No. 16

A die is thrown repeatedly until a six comes up. What is the sample space for this experiment?

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EXERCISE 16.2 - Question No. 1

A die is rolled. Let E be the event die shows 4 and F be the event die shows even number. Are E and F mutually exclusive?

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EXERCISE 16.2 - Question No. 2

A die is thrown. Describe the following events: (i) A : a number less than 7 (ii) B : a number greater than 7 (iii) C : a multiple of 3 (iv) D : a number less than 4 (v) E : a even number greater than 4 (vi) F : a number not less than 3 Also find \bar{A}

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EXERCISE 16.2 - Question No. 3

An experiment involves rolling a pair of dice and recording the numbers that come up. Describe the following events: A: the sum is greater than 8, B: 2 occurs on either die C: the sum is at least 7 and a multiple of 3. Which pairs of these events are mutually exclusive?

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EXERCISE 16.2 - Question No. 4

Three coins are tossed once. Let A denote the event three heads show, B denote the event two heads and one tail show, C denote the event three tails show and D denote the event 'a head shows on the first coin. Which events are (i) mutually exclusive? (ii) simple? (iii) Compound?

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EXERCISE 16.2 - Question No. 5

Three coins are tossed. Describe (i) Two events which are mutually exclusive. (ii) Three events which are mutually exclusive and exhaustive. (iii) Two events, which are not mutually exclusive. (iv)

Two events which are mutually exclusive but not exhaustive. (v) Three events which are mutually exclusive but not exhaustive.

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EXERCISE 16.2 - Question No. 6

Two dice are thrown. The events A, B and C are as follows: A :

getting an even number on the first die. B : getting an odd number on

the first die. C : getting the sum of the numbers on the dice 5. Describe

the events (i) A' (ii) not B (

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EXERCISE 16.2 - Question No. 7

Refer to question 6 above, state true or false: (give reason for your answer) (i) A and B are mutually exclusive. (ii) A and B are mutually exclusive and exhaustive. (iii) $A = B'$ (iv) A and C are mutually exclusive. (v) A and B^c are mutually exclusive (vi) A^c , B^c and C are mutually exclusive and exhaustive.

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EXERCISE 16.3 - Question No. 1

Which of the following cannot be valid assignment of probabilities for

outcomes of sample Space $S = \{\omega_1, \omega_2, \omega_3, \omega_4, \omega_5, \omega_6, \omega_7\}$

Assignment $\omega_1 \omega_2 \omega_3 \omega_4 \omega_5 \omega_6 \omega_7$

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EXERCISE 16.3 - Question No. 2

A coin is tossed twice, what is the probability that atleast one tail occurs?

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EXERCISE 16.3 - Question No. 3

A die is thrown, find the probability of following events: (i) A prime number will appear, (ii) A number greater than or equal to 3 will appear, (iii) A number less than or equal to one will appear, (iv) A number more than 6 will appear, (v) A number less than 6 will appear.

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EXERCISE 16.3 - Question No. 4

A card is selected from a pack of 52 cards. (a) How many points are there in the sample space? (b) Calculate the probability that the card is an ace of spades. (c) Calculate the probability' that the card is (i) an ace (ii) black card.

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EXERCISE 16.3 - Question No. 5

A fair coin with 1 marked on one face and 6 on the other and a fair die are both tossed, find the probability that the sum of numbers that turn up is (i) 3 (ii) 12

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EXERCISE 16.3 - Question No. 6

There are four men and six women on the city council. If one council member is selected for a committee at random how likely is it that it is a woman?

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EXERCISE 16.3 - Question No. 7

A fair coin is tossed four times, and people win Re 1 for each head and lose Rs 1.50 for each tail that turns up. From the sample space calculate how many different amounts of money you can have after four tosses and the probability' of having each of these amounts.

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EXERCISE 16.3 - Question No. 8

Three coins are tossed once. Find the probability of getting (i) 3 heads (ii) 2 heads (iii) atleast 2 heads (iv) atmost 2 heads (v) no head (vi) 3 tails (vii) exactly two tails (vm) no tail (ix) atmost two tails

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EXERCISE 16.3 - Question No. 9

If $\frac{2}{11}$ is the probability of an event, what is the probability of the event not A

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EXERCISE 16.3 - Question No. 10

A letter is chosen at random from the word ASSASSINATION. Find the probability that letter is (i) a vowel (ii) a consonant.

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EXERCISE 16.3 - Question No. 11

In a lottery, a person chooses six different natural numbers at random from 1 to 20, and if these six numbers match with the six numbers already fixed by the lottery committee, he wins the prize. What is the probability of Winning the prize in the game. [Hint order of the numbers is not important.]

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EXERCISE 16.3 - Question No. 12

Check whether the following probabilities $P(A)$ and $P(B)$ are

consistently defined (i) $P(A) = 0.5$, $P(B) = 0.7$,

$P(A \cap B) = 0.6$ (ii) $P(A) = 0.5$, $P(B) = 0.4$, $P(A \cup B) = 0.8$

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EXERCISE 16.3 - Question No. 13

Fill in the blanks in the following table: $P(A)$ $P(B)$ $(A \cap B)$ $P(A \cup B)$

(i) $\frac{1}{3}$ $\frac{1}{5}$ $\frac{1}{15}$... (ii) 0.35 ... 0.25 0.6 (iii) 0.5 0.35 ... 0.7

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EXERCISE 16.3 - Question No. 14

Give $P(A) = \frac{3}{5}$ and $P(B) = \frac{1}{5}$. Find $P(A \text{ or } B)$, if A and B are mutually exclusive events.

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EXERCISE 16.3 - Question No. 15

If E and F are events such that

$$P(E) = \frac{1}{4}, P(F) = \frac{1}{2} \text{ and } P(E \text{ and } F) = \frac{1}{8}, \text{ find (i)}$$

$$P(E \text{ or } F), \text{ (ii) } P(\neg E \text{ and } \neg F).$$

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EXERCISE 16.3 - Question No. 16

Events E and F are such that $P(\neg E \text{ or } \neg F) = 0.25$, State whether

E and F are mutually exclusive.

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EXERCISE 16.3 - Question No. 17

A and B are events such that $P(A) = 0.42$, $P(B) = 0.48$ and

$P(A \text{ and } B) = 0.16$. Determine (i) $P(\text{not } A)$, (ii) $P(\text{not } B)$ and (iii)

$P(A \text{ or } B)$

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EXERCISE 16.3 - Question No. 18

In Class XI of a school 40% of the students study Mathematics and

30% study Biology. 10% of the class study both Mathematics and

Biology. If a student is selected at random from the class, find the

probability that he will be studying Mathematics or Biology.

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EXERCISE 16.3 - Question No. 19

In an entrance test that is graded on the basis of two examinations, the probability of a randomly chosen student passing the first examination is 0.8 and the probability of passing the second examination is 0.7.

The probability of passing atleast one of them is 0.95. What is the probability of passing both?

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EXERCISE 16.3 - Question No. 20

The probability that a student will pass the final examination in both English and Hindi is 0.5 and the probability of passing neither is 0.1.

If the probability of passing the English examination is 0.75, what is the probability' of passing the Hindi examination?

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EXERCISE 16.3 - Question No. 21

In a class of 60 students, 30 opted for NCC, 32 opted for NSS and 24 opted for both NCC and NSS. If one of these students is selected at random, find the probability that (i) The student opted for NCC or NSS. (ii) The student has opted neither NCC nor NSS. (iii) The student has opted NSS but not NCC.

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MISCELLANEOUS EXERCISE - Question No. 1

A box contains 10 red marbles, 20 blue marbles and 30 green marbles. 5 marbles are drawn from the box, what is the probability that (i) all

will be blue (ii) atleast one will be green?

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MISCELLANEOUS EXERCISE - Question No. 2

4 cards are drawn from a well - shuffled deck of 52 cards. What is the probability of obtaining 3 diamonds and one spade?

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MISCELLANEOUS EXERCISE - Question No. 3

A die has two faces each with number ' 1 three faces each with number '2' and one face with number '3'.If die is rolled once, determine (i) $P(2)$
(ii) $P(1 \text{ or } 3)$ (iii) $P(\text{not } 3)$

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MISCELLANEOUS EXERCISE - Question No. 4

In a certain lottery 10,000 tickets are sold and ten equal prizes are awarded. What is the probability of not getting a prize if you buy (a) one ticket (b) two tickets (c) 10 tickets.

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MISCELLANEOUS EXERCISE - Question No. 5

Out of 100 students, two sections of 40 and 60 are formed. If you and your friend are among the 100 students, what is the probability that (a) you both enter the same section? (b) you both enter the different sections?

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MISCELLANEOUS EXERCISE - Question No. 6

Three letters are dictated to three persons and an envelope is addressed to each of them, the letters are inserted into the envelopes at random so that each envelope contains exactly one letter. Find the probability that at least one letter is in its proper envelope.

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MISCELLANEOUS EXERCISE - Question No. 7

A and B are two events such that $P(A) = 0.54$, $P(B) = 0.69$ and $P(A \cap B) = 0.35$. Find (i) $P(A \cup B)$ (ii) $P(A' \cap B')$ (iii)

$$P(A \cap B') \text{ (iv) } P(B \cap A')$$

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MISCELLANEOUS EXERCISE - Question No. 8

From the employees of a company, 5 persons are selected to represent them in the managing committee of the company. Particulars of five persons are as follows:

S.No.	Name	Sex	Age in years
1.	Harish	M	30
2.	Rohan	M	33
3.	Sheetal	F	46
4.	Alis	F	28
5.	Salim	M	41

A person is selected at random from this group to act as a spokesperson. What is the probability that the spokesperson will be either male or over 35 years?

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MISCELLANEOUS EXERCISE - Question No. 9

If 4-digit numbers greater than 5,000 are randomly formed from the digits 0, 1, 3, 5, and 7. what is the probability of forming a number divisible by 5 when, (i) the digits are repeated? (ii) the repetition of digits is not allowed?

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MISCELLANEOUS EXERCISE - Question No. 10

The number lock of a suitcase has 4 wheels, each labelled with ten digits i.e., from 0 to 9. The lock opens with a sequence of four digits with no repeats. What is the probability of a person getting the right sequence to open the suitcase?

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SOLVED EXAMPLES - Question No. 1

Two coins (a one rupee coin and a two rupee coin) are tossed once.

Find a sample space.

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SOLVED EXAMPLES - Question No. 2

Find the sample space associated with the experiment of rolling a pair of dice (one is blue and the other red) once. Also, find the number of elements of this sample space.

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SOLVED EXAMPLES - Question No. 2

Find the sample space associated with the experiment of rolling a pair of dice (one is blue and the other red) once. Also, find the number of elements of this sample space.

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SOLVED EXAMPLES - Question No. 3

In each of the following experiments specify appropriate sample space

- (i) A boy has a 1 rupee coin, a 2 rupee coin and a 5 rupee coin in his pocket. He takes out two coins out of his pocket, one after the other.
- (ii) A person is noting down the number of accidents along a busy highway during a year.

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SOLVED EXAMPLES - Question No. 4

A coin is tossed. If it shows head, we draw a ball from a bag consisting of 3 blue and 4 white balls; if it shows tail we throw a die.

Describe the sample space of this experiment.

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SOLVED EXAMPLES - Question No. 5

Consider the experiment in which a coin is tossed repeatedly until a head comes up. Describe the sample space.

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SOLVED EXAMPLES - Question No. 6

Consider the experiment of rolling a die. Let A be the event 'getting a prime number'. B be the event 'getting an odd number'. Write the sets representing the events (i) A or B (ii) A and B (iii) A but not B (iv) 'not A'.

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SOLVED EXAMPLES - Question No. 7

Two dice are thrown and the sum of the numbers which come up on the dice is noted. Let us consider the following events associated with this experiment A: the sum is even. B: the sum is a multiple of 3. C:

the sum is less than 4. D: the sum is greater than 11. Which pairs of these events are mutually exclusive?

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SOLVED EXAMPLES - Question No. 8

A coin is tossed three times, consider the following events. A : No head appears, B: Exactly one head appears and C: Atleast two appear. Do they form a set of mutually exclusive and exhaustive events?

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SOLVED EXAMPLES - Question No. 9

Let a sample space be $S = \{\omega_1, \omega_2, \dots, \omega_6\}$. Which of the following assignments of probabilities to each outcome are valid? Outcomes ω_1

$\omega_2 \omega_3 \omega_4 \omega_5 \omega_6$ (a) $\frac{1}{6} \frac{1}{6} \frac{1}{6} \frac{1}{6}$

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SOLVED EXAMPLES - Question No. 10

One card is drawn from a well shuffled deck of 52 cards. If each outcome is equally likely, calculate the probability that the card will be (i) a diamond and nbsp; and nbsp; (ii) not an ace (iii) a black card (i.e., a club or. a spade) (iv) not a diamond (v) not a black card.

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SOLVED EXAMPLES - Question No. 11

A bag contains 9 discs of which 4 are red. 3 are blue and 2 are yellow.

The discs are similar in shape and size. A disc is drawn at random

from the bag. Calculate the probability that it will be (i) red. (ii)

yellow, (iii) blue, (iv) not blue, (v) either red or yellow.

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SOLVED EXAMPLES - Question No. 12

Two students Anil and Ashima appeared in an examination. The

probability that Anil will qualify the examination is 0.05 and that

Ashima will qualify the examination is 0.10. The probability that both

will qualify the examination is 0.02. Find the probability that (a) Both

Anil and Ashima will not qualify the examination. (b) Atleast one of

them will not qualify the examination and (c) Only one of them will qualify the examination.

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SOLVED EXAMPLES - Question No. 13

A committee of two persons is selected from two men and two women. What is the probability that the committee will have (a) no man? (b) one man? (c) two men?

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SOLVED EXAMPLES - Question No. 14

On her vacations Veena visits four cities (A, B, C and D) in a random order. What is the probability that she visits (i) A before B ? (ii) A before B and B before C ? (iii) A first and B last? (iv) A either first or second? (v) A just be

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SOLVED EXAMPLES - Question No. 15

Find the probability that when a hand of 7 cards is drawn from a well shuffled deck of 52 cards, it contains (i) all Kings (ii) 3 Kings (iii) at least 3 Kings.

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SOLVED EXAMPLES - Question No. 16

If A, B, C are three events associated with a random experiment prove that

$$P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap C) - P(B \cap C)$$

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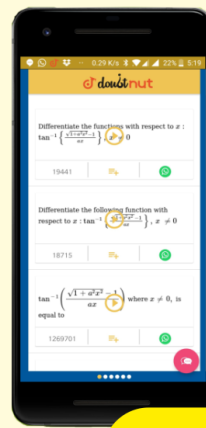
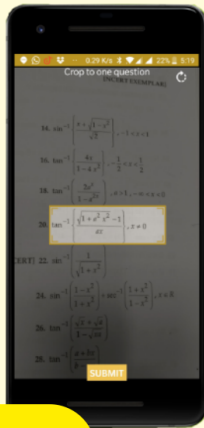
SOLVED EXAMPLES - Question No. 17

In a relay race there are five teams A, B, C, D and E. (a) What is the probability that A, B and C finish first, second and third, respectively.

(b) What is the probability that A, B and C are first three to finish (in any order) (Assume that all finishing orders are equally likely).

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