Number System Ex 1.4 Q10

Answer :

Let

$a = 0.3030030003...$

$b = 0.3010010001...$

Here decimal representation of a and b are non-terminating and non-repeating. So a and b are irrational numbers. We observe that in first two decimal place of a and b have the same digit but digit in the third place of their decimal representation is distinct.

Therefore, $a > b$.

Hence one rational number is $\boxed{0.3011}$ lying between $0.3030030003...$ and $0.3010010001...$

And irrational number is $0.3020200200020000...$ lying between $0.3030030003...$ and $0.3010010001...$

Number System Ex 1.4 Q11

Answer :

Let

$a = 0.5$

$b = 0.55$

Here a and b are rational number. So we observe that in first decimal place a and b have same digit .So $a < b$.

Hence two irrational numbers are $\boxed{0.510100100010000...}$ and $\boxed{0.5202002000200002...}$ lying between 0.5 and 0.55.

Number System Ex 1.4 Q12

Answer :

Let

$a = 0.1$

$b = 0.12$

Here a and b are rational number. So we observe that in first decimal place a and b have same digit. So $a < b$.

Hence two irrational numbers are $\boxed{0.1010010001...}$ and $\boxed{0.11010010001...}$ lying between 0.1 and 0.12.

Number System Ex 1.4 Q13

Answer :

Given that $\sqrt{3}+\sqrt{5}$ is an irrational number

Now we have to prove $\sqrt{3}+\sqrt{5}$ is an irrational number

Let $x = \sqrt{3}+\sqrt{5}$ is a rational

Squaring on both sides

$$\Rightarrow x^2 = \left(\sqrt{3}+\sqrt{5}\right)^2$$

$$\Rightarrow x^2 = \left(\sqrt{3}\right)^2 + \left(\sqrt{5}\right)^2 + 2\sqrt{3}\times\sqrt{5}$$

$$\Rightarrow x^2 = 3+5+2\sqrt{15}$$

$$\Rightarrow x^2 = 8+2\sqrt{15}$$

$$\Rightarrow \frac{x^2-8}{2} = \sqrt{15}$$

Now x is rational

$\Rightarrow x^2$ is rational

$\Rightarrow \dfrac{x^2-8}{2}$ is rational

$\Rightarrow \sqrt{15}$ is rational

But, $\sqrt{15}$ is an irrational

Thus we arrive at contradiction that $\sqrt{3}+\sqrt{5}$ is a rational which is wrong.

Hence $\sqrt{3}+\sqrt{5}$ is an irrational

Number System Ex 1.4 Q14

Answer :

Let $x = \frac{5}{7} = 0.\overline{714285}$ and $y = \frac{9}{11} = 0.\overline{81}$

Here we observe that in the first decimal x has digit 7 and y has 8. So $x < y$. In the second decimal place x has digit 1. So, if we considering irrational numbers

a = 0.72072007200072..b = 0.73073007300073..c = 0.74074007400074....

We find that

$x < a < b < c < y$

Hence $\boxed{a, b, c}$ are required irrational numbers.

*********** END **********