

Logarithms

Question1

Which one of the following observations is correct for the features of logarithm function to any base $b > 1$?

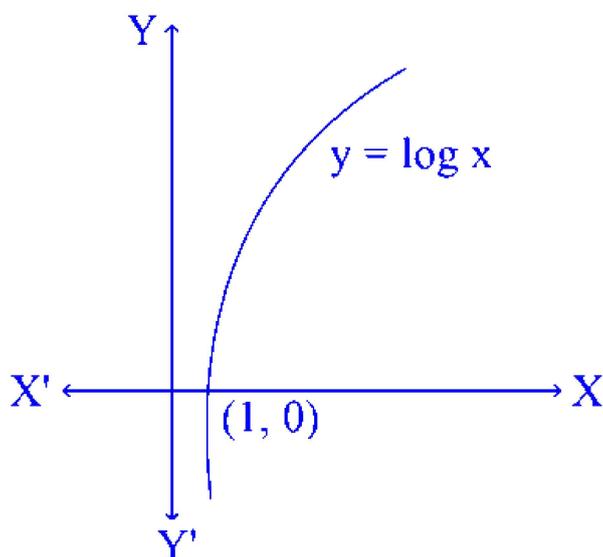
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Options:

- A. The domain of the logarithm function is R , the set of real numbers.
- B. The range of the logarithm function is R^+ , the set of all positive real numbers.
- C. The point $(1, 0)$ is always on the graph of the logarithm function.
- D. The graph of the logarithm function is decreasing as we move from left to right.

Answer: C

Solution:



\therefore Domain $\in R^+$ and range $\in R$ and graph of the logarithm function is increasing.

So, point $(1, 0)$ is always on the graph of logarithm function.

Question2

The value of $e^{\log_{10} \tan 1^\circ + \log_{10} \tan 2^\circ + \log_{10} \tan 3^\circ + \dots + \log_{10} \tan 89^\circ}$ is



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Options:

A. 3

B. $\frac{1}{e}$

C. 1

D. 0

Answer: C

Solution:

We know that

$$\tan \theta \tan (90^\circ - \theta) = \tan \theta \cdot \cot \theta = 1$$

$$\tan 1^\circ \tan 89^\circ = \tan 2^\circ \tan 88^\circ = \tan 3^\circ \tan 87^\circ = \tan 44^\circ \tan 46^\circ = 1$$

So, $\log_{10} \tan 1^\circ + \log_{10} \tan 2^\circ \dots \log_{10} \tan 89^\circ$

$$= (\log_{10} \tan 1^\circ + \log_{10} \tan 89^\circ) + (\log_{10} \tan 2^\circ + \log_{10} \tan 88^\circ) + \dots + (\log_{10} \tan 44^\circ + \log_{10} \tan 46^\circ) + \log_{10} \tan 45^\circ$$

$$= \log_{10} (\tan 1^\circ + \tan 89^\circ) + \log_{10} (\tan 2^\circ + \tan 88^\circ) + \dots + \log_{10} (\tan 44^\circ + \tan 46^\circ) + \log_{10} \tan 45^\circ = \log_{10} 1 + \dots + \log_{10} 1 + \log_{10} 1$$

$$= 0$$

Thus, $e^{\log_{10} \tan 1^\circ + \log_{10} \tan 2^\circ + \dots + \log_{10} \tan 89^\circ}$

$$= e^0 = 1$$

