

Answer on Question #56903, Math / Calculus

1. Solve for x:

$$150 = 50e^{7x}$$

A:  $x = 1/e$

B:  $x = \ln(3) - 7$

C:  $x = \ln(3)/7$

D:  $x = \ln(150)/7 \cdot \ln(50)$

**Solution.**

We have

$$150 = 50e^{7x}$$

Therefore

$$\frac{150}{50} = e^{7x}$$

$$3 = e^{7x}$$

We know that

$$a = \ln b \Leftrightarrow b = e^a$$

Hence

$$7x = \ln 3$$

So,  $x = \frac{\ln 3}{7}$ . The correct answer is C.

**Answer: C.**

2.

Solve for x:

$$3500 = 700 \cdot 2^{8x}$$

Check all that apply.

$$X = \log(5)/8$$

$$x = \ln(5)/8 \cdot \ln(2)$$

$$x = \log(5)/8 \cdot \log(2)$$

$$x = \ln(8)/5$$

**Solution.**

We have

$$3500 = 700 \cdot 2^{8x}$$

Therefore

$$\frac{3500}{700} = 2^{8x}$$

$$5 = 2^{8x}$$

We know that

$$a = \log_c b \Leftrightarrow b = c^a$$

Hence

$$8x = \log_2 5$$

$$\text{So } x = \frac{\log_2 5}{8}.$$

$$\text{Let } x \text{ be } \frac{\log 5}{8} \text{ then } \frac{\log 5}{8} = \frac{\log_2 5}{8}.$$

Hence,  $\log 5 = \log_2 5 \Rightarrow \log_{10} 5 = \log_2 5 \Rightarrow 10 = 2$ . This is wrong.

$$\text{Let } x \text{ be } \frac{\ln 5}{8 \ln 2} \text{ then } \frac{\ln 5}{8 \ln 2} = \frac{\log_2 5}{8}. \text{ We know that } \frac{\ln a}{\ln b} = \log_b a.$$

$$\text{Hence, } \frac{\ln 5}{8 \ln 2} = \frac{\log_2 5}{8}. \text{ This is true.}$$

$$\text{Let } x \text{ be } \frac{\log 5}{8 \log 2} \text{ then } \frac{\log 5}{8 \log 2} = \frac{\log_2 5}{8}. \text{ We know that } \frac{\log a}{\log b} = \log_b a.$$

$$\text{Hence, } \frac{\log 5}{8 \log 2} = \frac{\log_2 5}{8}. \text{ This is true.}$$

$$\text{Let } x \text{ be } \frac{\ln 8}{5} \text{ then } \frac{\ln 8}{5} = \frac{\log_2 5}{8}. \text{ Hence}$$

$$8 \ln 8 = 5 \log_2 5 \Rightarrow 8 \ln 2^3 = 5 \log_2 5 \Rightarrow 8 \cdot 3 \ln 2 = \log_2 5^5 \Rightarrow$$

$$\Rightarrow 24 \ln 2 = 5 \log_2 5 \Rightarrow \frac{24}{\log_2 e} = 5 \log_2 5 \Rightarrow \frac{24}{5} = \log_2 e \cdot \log_2 5 < \log_2 2^{1.5} \cdot \log_2 2^{2.5} = 1.5 \cdot 2.5 = 3.75.$$

Thus we obtained

$$\frac{24}{5} = 4,8 < 3,75.$$

This is wrong.

**Answer:**  $x = \frac{\ln 5}{8 \ln 2} = \frac{\log 5}{8 \log 2}.$

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