Answer on Question #56904 - Math – Calculus

Task 1. The x-intercept of the graph of $f(x) = 3\log(x-5) + 2$ is:

A: $10^{\frac{2}{3}} - 5$

B: $10^{-\frac{2}{3}} - 5$

C: $10^{-\frac{2}{3}} + 5$

D: $10^{\frac{2}{3}} + 5$

Solution.

Solve the following equation:

$$3\log(x-5) + 2 = 0 \Leftrightarrow 3\log(x-5) = -2 \Leftrightarrow \log(x-5) = -\frac{2}{3}$$

And find x:

$$x - 5 = 10^{-\frac{2}{3}} \Leftrightarrow x = 10^{-\frac{2}{3}} + 5$$

Answer: C: $10^{-\frac{2}{3}} + 5$.

Task 2. The population (in millions) of a certain country can be approximated by the function:

$$p(x) = 100 \cdot 1.02^x$$

Where x is the number of years after 2000. Which of the following calculations will tell in what year the population can be expected to reach 300 million?

A: $\frac{\ln 3}{\ln 1.02}$

B: $\ln\frac{3}{1.02}$

C: $\frac{\ln 3}{\ln 1.02} + 2000$

D: $\ln\frac{3}{1.02} + 2000$

Solution.

Solve the following equation:

$$300 = 100 \cdot 1.02^x \Leftrightarrow 1.02^x = 3$$

Find x:

$$x = \log_{1.02} 3$$

Using formula:

$$\log_a b = \frac{\log_c b}{\log_c a}$$

And let $c = e$ we get:

$$x = \frac{\ln 3}{\ln 1.02}$$

But x is the number of years after 2000. Then, correct answer is $\frac{\ln 3}{\ln 1.02} + 2000$

Answer: C