

Answer on Question #42004– Math - Algebra

Question:

In september 1998 the population of the country of West Goma in millions was modeled by $f(x) = 16.9e^{0.0019x}$. At the same time the population of East Goma in millions was modeled by $g(x) = 13.5e^{0.0106x}$. In both formulas x is the year, where $x=0$ corresponds to September 1998. Assuming these trends continue, estimate what the population will be when the populations are equal.

Solution:

When the populations are equal we have $f(x) = g(x)$

$$16.9e^{0.0019x} = 13.5e^{0.0106x}$$

Take natural logarithm in both parts:

$$\log 16.9 + \log e^{0.0019x} = \log 13.5 + \log e^{0.0106x}$$

$$\log 16.9 + 0.0019x = \log 13.5 + 0.0106x$$

$$0,0087x = \log 16.9 - \log 13.5$$

$$0,0087x = \log \frac{169}{135}$$

$$x = \frac{\log \frac{169}{135}}{0,0087} = 25.818843274097014174767797601939 \approx 25.82$$

Hence, the population of each city, when the populations are equal, will be $16.9e^{0.0019x}|_{x=25.82} \approx 17,75$.

Answer: 17,75.