Detyre Dosje

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Ushtrimi 14 Fq.164

Zgjidhni ekuacionet e meposhtme.

$$a) \qquad \log_3 x + \log_3(x-1) = \log_3 12$$

$$\text{B.V.L} = \begin{cases} x \geq 0 \\ x-1 \geq 0 \end{cases} (=) \begin{cases} x \geq 0 \\ x \geq 1 \end{cases} (=) \; x \geq 1$$

$$\log_3 x + \log_3(x-1) = \log_3 12$$

$$\log_3(x \cdot (x-1)) = \log_3 12$$

$$x \cdot (x-1) = 12$$

$$x^2 - x - 12 = 0$$

$$x = -3, \text{ ose } \boxed{x = 4}$$

$$b) \qquad \log_3 x - \log_3(x-1) = 2$$

$$B.V.L = \begin{cases} x \geq 0 \\ x-1 \geq 0 \end{cases} (=) \begin{cases} x \geq 0 \\ x \geq 1 \end{cases} (=) \; x \geq 1$$

$$\log_3 x - \log_3(x-1) = \log_3 9$$

$$\log_3\left(\frac{x}{(x-1)}\right) = \log_3 9$$

$$\frac{x}{(x-1)} = 9$$

$$x = 9\,x - 9$$

$$8\,x - 9 = 0$$

$$\boxed{x = \frac{9}{8}}$$

$$c) \qquad 3\,\ln x - \ln 2x = 5$$

$$B.V.L = \begin{cases} x \geq 0 \\ 2\,x \geq 0 \end{cases} (=) \quad x \geq 0$$

$$\ln x^3 - \ln 2x = 5$$

$$\ln\left(\frac{x^3}{2\,x}\right) = 5$$

$$e^5 = \frac{x^2}{2}$$

$$2\,e^5 = x^2$$

$$|\,x\,| = \sqrt{2\,e^5}$$

$$\boxed{x = \sqrt{2\,e^5}}, \text{ ose } x = -\sqrt{2\,e^5}$$

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Perqendrimi i nje ilaci, C (mg per liter), ne gjakun e nje pacienti ne castin t (ore) pas injektimit te tij, eshte modeluar me ate te ekuacionit $C = C_0\, e^{-r\,t}$, ku C_0 eshte perqendrimi fillestar dhe r eshte nje tregues e shkalles se renies see perqendrimit.

Perqendrimi pas 1 ore eshte 9,2mg/liter dhe pas 2 oresh eshte 8.5mg/liter.

a) Njehsoni perqendrimin fillestar dhe vleren e r.

$$\begin{cases} 9.2 = C_0\, e^{-r\,1} \\ 8.5 = C_0\, e^{-r\,2} \end{cases} (=) \begin{cases} \frac{9.2}{C_0} = e^{-r\,1} \\ \frac{8.5}{C_0} = e^{-r\,2} \end{cases} (=) \begin{cases} \frac{9.2}{C_0} = e^{-r} \\ \frac{8.5}{C_0} = (e^2)^{-r} \end{cases} (=) \begin{cases} \ln \frac{9.2}{C_0} = -r \\ \frac{1}{2} \ln \frac{8.5}{C_0} = -r \end{cases}$$

$$(=) \ln \frac{9.2}{C_0} = \frac{1}{2} \ln \frac{8.5}{C_0} (=) \ln 9.2 - \ln C_0 = \frac{1}{2} (\ln 8.5 - \ln C_0)$$

$$(=) 2 \ln 9.2 - 2 \ln C_0 = \ln 8.5 - \ln C_0 (=) \ln C_0 = 2 \ln 9.2 - \ln 8.5$$

$$(=) \ln C_0 = \ln\left(\frac{9.2^2}{8.5}\right) (=) \boxed{C_0 = \frac{9.2^2}{8.5}} (=) C_0 \approx 9.95765 \ \frac{\text{mg}}{l}$$

$$\longrightarrow \ln \frac{9.2}{C_0} = -r$$

$$\ln \frac{9.2}{\frac{9.2^2}{8.5}} = -r \ (=) \boxed{-\ln \frac{8.5}{9.2} = r} (=) \ r \approx 0.0791373$$

Ilaci nuk ka me efekt kur perqendrimi bie nen 3.6 mg/l

b) Cila eshte koha maksimale qe duhet te kaloje, perpara se pacientit ti jepet doza e dyte? Jepni pergjigjen me 1 ore perafersi.

$$C < 3.6 \ \frac{\text{mg}}{l}$$

$$C_0\, e^{-r\,t} < 3.6 \ \frac{\text{mg}}{l}$$

$$\frac{9.2^2}{8.5} \cdot e^{\ln \frac{8.5}{9.2} \cdot t} < 3.6$$

$$e^{\ln \frac{8.5}{9.2} \cdot t} < \frac{3.6}{\frac{9.2^2}{8.5}}$$

$$\left(e^{\left(\ln \frac{8.5}{9.2}\right)}\right)^t < \frac{3.6}{\frac{9.2^2}{8.5}}$$

$$\left(\frac{8.5}{9.2}\right)^t < \frac{3.6}{\frac{9.2^2}{8.5}}$$

$\frac{8.5}{9.2} < 0$, funksioni $f(k) = k^g$ per $k < 0$ eshte zbrites :

$$\Rightarrow \log_{\frac{8.5}{9.2}} \frac{3.6}{\frac{9.2^2}{8.5}} > t$$

$$\boxed{t > 12.8562}$$

Pas rreth 13 oresh , ilaci humb efektin .