

⑥ $P_0 = 100 \rightarrow t = 0$ $t = 24 \rightarrow m = ?$

$$-\frac{dm}{dt} = km$$

$$-dm = km \cdot dt$$

$$\int \frac{dm}{m} = \int k dt$$

$$-\int \frac{dm}{m} = \int k dt$$

$$-\ln(m) = kt + C$$

$$\ln(m) = -kt + C$$

$$e^{\ln(m)} = e^{(-kt+C)}$$

$$m = e^{-kt} \cdot e^C$$

$$m = C e^{-kt}$$

$$100 = C e^{-k \cdot 0}$$

$$100 = C$$

$$m = 100 e^{-kt}$$

$$P_6 = 100 \cdot (0.03)$$

$$P_6 = 3$$

$$P_6 = 100 - 3 \rightarrow 97$$

$$P_6 = 97$$

$$0.1218368199$$

$$97 = 100 e^{-k(6)}$$

$$\frac{97}{100} = e^{-k(6)}$$

$$\ln\left(\frac{97}{100}\right) = \ln e^{-k(6)}$$

$$\ln\left(\frac{97}{100}\right) = -6k \ln e$$

$$\ln\left(\frac{97}{100}\right) = -6k$$

$$-\left(\frac{\ln\left(\frac{97}{100}\right)}{6}\right)t$$

$$m = 100 e^{-kt}$$

$$t = 24 \rightarrow \left[\ln 97 - \ln 100 \right] \cdot 24$$

$$m = 100 e^{-kt}$$

$$m = 100 e^{-kt}$$

$$m = 88.5292$$

La cantidad que queda después de 24 horas
es 88.5292 miligramos.

Res

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$$\left(\frac{\ln 97 - \ln 100}{6} \right) t$$

$$\frac{50}{2} = 100 e$$

$$\left(\frac{\ln 97 - \ln 100}{6} \right) t$$

$$\frac{1}{2} = e$$

$$\ln\left(\frac{1}{2}\right) = \left[\frac{\ln(97) - \ln(100)}{6} \right] t \ln e$$

$$\frac{6 \ln\left(\frac{1}{2}\right)}{(\ln 97 - \ln 100)} = t$$

$$136.5394 = t$$

La vida media de la sustancia radioactiva
es de 136.5394 horas

Res

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I

$$t = 3ft$$

$$I(3) = I_0(0.25)$$

$$I = I_0(1 - 0.25)$$

$$\frac{dI}{dt} = -kI$$

$$\frac{dI}{I} = -k dt$$

$$\int \frac{dI}{I} = -k \int dt$$

$$\ln I = -kt + C$$

$$e^{\ln I} = e^{-kt + C}$$

$$I = e^{-kt} \cdot e^C$$

$$I = e^{-kt} \cdot C$$

$$I = e^{-k(0)} \cdot C$$

$$I_0 = C$$

t = espesor, en pies

$$I_0(0.25) = I_0 e^{-3k}$$

$$0.25 = e^{-3k}$$

$$\ln 0.25 = -3k$$

$$\frac{\ln 0.25}{-3} = k$$

$$0.4621 = k$$

$$I_{(15)} = I_0 e^{-0.4621(15)}$$

$$I_{(15)} = I_0 e^{-6.9315}$$

$$I_{(15)} = I_0 [0.0009765]$$

La intensidad del rayo a 15 pies bajo la superficie, ~~sería~~ el resultado de multiplicar 0.0009765 por la intensidad inicial $I(0)$

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$$\frac{ds}{dt} = rs$$

a)

$$\$5000 = S(0)$$

$$t=5 \rightarrow S(5) = ?$$

$$r = 5 \frac{3}{4} \% = \frac{5.75}{100} = 0.0575$$

$$\frac{ds}{s} = r dt \rightarrow \int \frac{ds}{s} = r \int dt$$

$$\ln(s) = rt + C \rightarrow e^{\ln(s)} = e^{(rt+C)}$$

$$s = e^{rt} \cdot e^C \rightarrow S = C e^{rt}$$

$$5,000 = C e^{(0.0575)(0)} \quad |$$

$$5000 = C$$

$$S = 5000 e^{0.0575t}$$

$$S = 5000 e^{0.0575(5)} = 6665.45$$

La cantidad reunida después de 5 años
es igual a \$6665.45



b)

$$(2)(5000) = 5000 e^{0.0575t}$$

$$2 = e^{0.0575t}$$

$$\rightarrow \ln(2) = 0.0575t \cancel{ly e^1}$$

$$\frac{\ln(2)}{0.0575} = t \rightarrow t = 12.05$$

El capital inicial se habrá duplicado después de 12.05 años

c)

$$S = 5000 \left(1 + \frac{1}{4} (0.0575) \right)^{20}$$

$$S = 6651.82$$

$$\Delta S = 6665.45 - 6651.82$$

$$\Delta S = 13.63$$

El resultado cuando se reúne trimestralmente varía en \$13.63, que cuando se reúne anualmente.

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