

① i) a)  $\log_3 27 = x \rightarrow 3^x = 27 \rightarrow 3^x = 3^3 \rightarrow \boxed{x=3}$

ii) b)  $\log_8 \frac{1}{8} = x \rightarrow 8^x = \frac{1}{8} \rightarrow 8^x = 8^{-1} \rightarrow \boxed{x=-1}$

iii) c)  $\log_{16} 4 = x \rightarrow 16^x = 4 \rightarrow (4^2)^x = 4 \rightarrow 4^{2x} = 4^1 \rightarrow 2x = 1 \rightarrow \boxed{x = \frac{1}{2}}$

b)  $\log_3 27 + \log_8 \frac{1}{8} - \log_{16} 4 = \log_{14} x$

$3 - 1 - \frac{1}{2} = \log_{14} x \rightarrow +\frac{3}{2} = \log_{14} x \rightarrow \cancel{14^{3/2}} \rightarrow$

$14^{3/2} = x \rightarrow \sqrt{14^3} = x \rightarrow \cancel{14^{3/2}} \rightarrow \sqrt{2^6} = x = 2^3 = \boxed{8}$

② a)  $\log_6 36 = x \rightarrow 6^x = 36 \rightarrow \boxed{x=2}$

b)  $\log_6 4 + \log_6 9 = \log_6 (4 \cdot 9) = \log_6 36 = \boxed{2}$

c)  $\log_6 2 - \log_6 12 = \log_6 \frac{2}{12} = \log_6 \frac{1}{6} = \log_6 6^{-1} = \boxed{-1}$

③ a)  $A(t) = 12 \cdot e^{0.4 \cdot 0} = \boxed{12}$  bacterias

b)  $A(4) = 12 \cdot e^{0.4 \cdot 4} = 12 \cdot e^{1.6} = 59.43 \approx \boxed{59}$  bacterias

c)  $400 = 12 \cdot e^{0.4 \cdot t} \rightarrow \frac{400}{12} = e^{0.4 \cdot t} \rightarrow \ln \frac{400}{12} = 0.4 \cdot t \cdot \ln e \rightarrow$

$\frac{\ln(\frac{400}{12})}{0.4} = t = \boxed{8.77}$  horas

d)  $60 = 24 \cdot e^{k \cdot 4} \rightarrow \ln \frac{60}{24} = 4k \cdot (\ln e) \rightarrow k = \frac{\ln(\frac{60}{24})}{4} = \frac{0.229}{3 \text{ c.s.}}$

e)  $12 \cdot e^{0.4 \cdot t} > 24 \cdot e^{0.229 \cdot t} \rightarrow \text{con C.G.} \rightarrow \frac{1}{2} = 1.6535$   
 Si  $t \in \mathbb{Z}$ , y ha dependido, por  $\boxed{t=5}$

(Ver como se resuelve en C.G.) PUNTOS.

$$\textcircled{4} \quad \text{a) } 3 \ln 2 - \ln 4 = \ln \frac{2^3}{4} = \boxed{\ln 2} \quad \textcircled{2}$$

$$\text{b) } 3 \ln 2 - \ln 4 = -\ln x \Rightarrow \ln 2 = -\ln x \Rightarrow \ln 2 = \ln x^{-1} \Rightarrow \frac{1}{x} = 2 \Rightarrow$$

$$\boxed{x = \frac{1}{2}}$$

$$\textcircled{5} \quad \text{a) } 2^m = 8 \rightarrow 2^m = 2^3 \rightarrow \boxed{m = 3}$$

$$2^n = 16 \rightarrow 2^n = 2^4 \rightarrow \boxed{n = 4}$$

$$\text{b) } (2^3)^{2x+1} = (2^4)^{2x-3} \rightarrow 2^{6x+3} = 2^{8x-12} \rightarrow 6x+3 = 8x-12 \rightarrow \boxed{x = \frac{15}{2}}$$

$$\textcircled{6} \quad \text{a) } \ln\left(\frac{5}{3}\right) = \ln 5 - \ln 3 = \boxed{y - x}$$

$$\text{b) } \ln 45 = \ln(9 \cdot 5) = \ln 3^2 + \ln 5 = 2 \ln 3 + \ln 5 = \boxed{2x + y}$$