1. Resuelve: $9^x - 2 \cdot 3^{x+2} + 81 = 0$

2. Resuelve: $2\log(3x-2) - 1 = \log(x+6)$

3. Resuelve: $\begin{cases} x + y = 22 \\ \log x - \log y = 1 \end{cases}$

4. Si log 2=0,3010, log 3= 0,4771, log 5= 0,6990. Calcula:

   a. $\log \sqrt[5]{\frac{1}{0,64}}$ b. $\log \frac{270}{128}$

5. Escribe la expresión algebraica de: $\log A = 3 + 3\log x - \frac{2}{5}\log(y) - 5\log z - 4\log\frac{x}{y}$

6. Resuelve: $\left.\begin{array}{r} \log x + \log y = 3 \\ x + \frac{y}{10} = 20 \end{array}\right\}$

7. Resuelve $\frac{\log 2 + \log(11 - x^2)}{\log(5-x)} = 2$

8. Resuelve $8^{1+x} + 2^{3x-1} = \frac{17}{16}$

(1) $9^x - 2\cdot 3^{x+2} + 81 = 0 \rightarrow (3^x)^2 - 2\cdot 3^x \cdot 3^2 + 81 = 0 \rightarrow$

$(3^x)^2 - 18\cdot 3^x + 81 = 0 \xrightarrow{3^x = t} t^2 - 18t + 81 = 0$

$t = \dfrac{18 \pm \sqrt{18^2 - 4\cdot 81}}{2} = 9 \rightarrow 3^x = 9 \rightarrow \boxed{x=2}$

(2) $2\log(3x-2) - 1 = \log(x+6)$

$\log(3x-2)^2 - \log 10 = \log(x+6) \rightarrow \cancel{\log}\dfrac{(3x-2)^2}{10} = \cancel{\log}(x+6) \Rightarrow$

$(3x-2)^2 = 10(x+6) \rightarrow 9x^2 - 12x + 4 = 10x + 60 \rightarrow$

$9x^2 - 22x - 56 = 0 \rightarrow x = 4$

$\rightarrow x = -\dfrac{14}{9}$ No vale.

(3) $\begin{cases} x+y=22 \\ \log x - \log y = 1 \end{cases} \quad \begin{cases} x+y=22 \\ \log \dfrac{x}{y} = \log 10 \end{cases} \quad \begin{cases} x+y=22 \\ x = 10y \end{cases} \quad \begin{cases} 11y = 22 \\ y = 2 \\ x = 20 \end{cases}$

(4) $\log 2 = 0{,}3010$; $\log 3 = 0{,}4771$; $\log 5 = 0{,}6990$

a) $\log \sqrt[5]{\dfrac{1}{0{,}64}} = \dfrac{1}{5}\log\dfrac{100}{64} = \dfrac{1}{5}\left[\log 100 - \log 64\right] =$

$= \dfrac{1}{5}\left[2 - \log 2^6\right] = \dfrac{1}{5}\left[2 - 6\cdot\log 2\right] = \dfrac{1}{5}\left[2 - 6\cdot 0{,}3010\right] =$

$= \dfrac{97}{2500} = 0{,}0388$

b) $\log\dfrac{270}{128} = \log 270 - \log 128 = \log 3^3\cdot 2\cdot 5 - \log 2^7 =$

$= 3\log 3 + \log 2 + \log 5 - 7\log 2 = 0{,}3243$

(5) $\log A = \log 1000 + \log x^3 - \log y^{2/5} - \log z^5 - \log\left(\dfrac{x}{y}\right)^4$

$\cancel{\log} A = \cancel{\log}\dfrac{1000\cdot x^3}{\sqrt[5]{y^2}\cdot z^5\cdot\dfrac{x^4}{y^4}} \rightarrow A = \dfrac{1000\, x^3 y^4}{\sqrt[5]{y^2}\, z^5\, x^4} = \dfrac{1000\cdot y^{18/5}}{z^5\cdot x}$

(6) $\log x + \log y = 3$; $\log xy = \log 1000$

$x + \dfrac{y}{10} = 20$; $xy = 1000$

$10x + y = 200$; $y = 200 - 10x$

$x(200-10x) = 1000$

$200x - 10x^2 = 1000$

$10x^2 - 200x + 1000 = 0 \rightarrow x^2 - 20x + 100 = 0 \rightarrow x = 10$

$y = 200 - 100 = 100$

(7) $\dfrac{\log 2 + \log(11-x^2)}{\log(5-x)} = 2 \Rightarrow \log\left[2(11-x^2)\right] = 2\log(5-x) \Rightarrow$

$\log\left[22-2x^2\right] = \log(5-x)^2 \rightarrow 22 - 2x^2 = 25 - 10x + x^2$

$3x^2 - 10x + 3 = 0 \rightarrow x = 3$

$\rightarrow x = \dfrac{1}{3}$

(8) $8^{1+x} + 2^{3x-1} = \dfrac{17}{16}$

$8 \cdot 8^x + (2^x)^3 \cdot \dfrac{1}{2} = \dfrac{17}{16} \rightarrow \dfrac{8(2^x)^3 \cdot 2 + (2^x)^3}{2} = \dfrac{17}{16}$

$2^x = t \rightarrow 16t^3 + t^3 = \dfrac{34}{16} \rightarrow 17t^3 = \dfrac{34}{16} \rightarrow t^3 = \dfrac{2}{16} = \dfrac{1}{8}$

$t^3 = 2^{-3} = \left(\dfrac{1}{2}\right)^3 \rightarrow t = \dfrac{1}{2}$

$2^x = \dfrac{1}{2} = 2^{-1} \rightarrow \boxed{x = -1}$