LOGARITMI ED ESPONENZIALI

M3054

CAMBIO BASE $\log_a b = \frac{\log_c b}{\log_c a}$

es: $\log_7 1000 = \frac{\log 1000}{\log 7} = \frac{3}{\log 7}$

1) $7 \cdot 5^{2x} = 3^{x+1}$ PRENDO IL log DI TUTTO

$\log(7 \cdot 5^{2x}) = \log(3^{x+1})$

$\log 7 + \log 5^{2x} = (x+1)\log 3$

$\log 7 + 2x \log 5 = x \log 3 + \log 3$

$2x \log 5 - x \log 3 = \log 3 - \log 7$

RACCOLGO x

$$x\,(2\log 5 - \log 3) = \log 3 - \log 7$$

$$x = \frac{\log 3 - \log 7}{2\log 5 - \log 3}$$

2) $$4 \cdot 5^x = 3 \cdot 7^x \rightarrow \frac{5^x}{7^x} = \frac{3}{4} \qquad \left(\frac{5}{7}\right)^x = \frac{3}{4}$$

$$\log\ 4 \cdot 5^x = \log\ 3 \cdot 7^x \rightarrow \log 4 + x \log 5 = \log 3 + x \log 7$$

$$x(\log 5 - \log 7) = \log 3 - \log 4 \qquad x = \frac{\log 3 - \log 4}{\log 5 - \log 7}$$

3) $$3^{x+1} + 2 \cdot 3^{2-x} = 29$$

$$\log \left[3^{x+1} + 2 \cdot 3^{2-x} \right] = \log 29$$

$$\log\left[3^x \cdot 3 + 2\cdot\left(3^2 \cdot 3^{-x}\right)\right] = \log 29 \qquad (3^{-x}) = (3^x)^{-1}$$

$$\log\left[3^x \cdot 3 + 18 \cdot 3^{-x}\right] = \log 29$$

$$\log\left[3^x \cdot 3 + \frac{18}{3^x}\right] = \log 29$$

$$\log\left[\frac{3 \cdot 3^x \cdot 3^x + 18}{3^x}\right] = \log 29 \qquad 3^x = t$$

$$\log\left(\frac{3t^2 + 18}{t}\right) = \log 29$$

$$\log(3t^2 + 18) - \log t = \log 29$$

$$\log(3t^2 + 18) = \log 29 + \log t \rightarrow \log(3t^2 + 18) = \lg 29t$$

$$3t^2 + 18 = 29t \rightarrow 3t^2 - 29t + 18 = 0$$

$$a = 3 \quad b = -29 \quad c = 18 \quad \Delta = 841 - 4 \cdot 3 \cdot 18 = 625$$

$$t = \frac{29 \pm 25}{6} = \begin{cases} 9 \\ \frac{2}{3} \end{cases}$$

$t_1 = 3^x = 9$

$3^x = 3^2$

$\boxed{x = 2}$

$t_2 = \frac{2}{3} \rightarrow 3^x = \frac{2}{3}$

$\log_3 \frac{2}{3} = x$

$x = \log_3 2 - \log_3 3 \rightarrow \boxed{x = \log_3 2 - 1}$