16/1/2018

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$$9\left(\frac{2}{3}\right)^x + 2 + 4\left(\frac{2}{3}\right)^{-x} \leq 0 \qquad \left(\frac{2}{3}\right)^x = t$$

$$9t + 2 + 4t^{-1} \leq 0$$

$$9t + 2 + \frac{4}{t} \leq 0$$

$$\frac{9t^2 + 2t + 4}{\cancel{t}} \leq 0$$

LO POSSO SEMPLIFICARE PERCHÉ $t > 0$
ESSENDO $t = \left(\frac{2}{3}\right)^x$ $\boxed{\text{PER OGNI } x}$

$$9t^2 + 2t + 4 \leq 0$$

$\Delta = 4 - 16 \cdot 9 = \ldots < 0$ IMPOSSIBILE (perché ≤ 0)

158

$$(0{,}01)^x - 7(0{,}1)^x - 30 \geq 0$$

$0{,}1 = \frac{1}{10}$

$0{,}01 = \frac{1}{100} = \left(\frac{1}{10}\right)^2$

$t = \left(\frac{1}{10}\right)^x$

$$t^2 - 7t - 30 \geq 0$$

$$(t-10)(t+3) \geq 0 \qquad t = \begin{cases} 10 \\ -3 \end{cases}$$

$$\underbrace{t \leq -3}_{\text{IMPOSSIBILE}} \quad \vee \quad t \geq 10$$

$$\left(\frac{1}{10}\right)^x \geq \left(\frac{1}{10}\right)^{-1} \longrightarrow \boxed{x \leq -1}$$

perché $0 < \frac{1}{10} < 1$

165)

$$16^x \geq 8 + 2\cdot 4^x$$

$$4^{2x} \geq 8 + 2\cdot 4^x \qquad 4^x = t$$

$$t^2 - 2t - 8 \geq 0$$

$$\Delta = 4 + 32 = 36 \qquad t = \frac{2 \pm 6}{2} = \begin{cases} -2 \\ 4 \end{cases}$$

$$\underbrace{t \leq -2}_{\text{IMPOSSIBILE}} \quad \vee \quad t \geq 4$$

$$4^x \geq 4^1 \Rightarrow \boxed{x \geq 1}$$

169)

$$4\cdot 2^{3x} - 4^{x+2} < 0 \qquad \cancel{4}\cdot 2^{3x} - 2^{2x}\cdot \cancel{16}^{\,4} < 0$$

$$4\cdot 2^{3x} - 2^{2(x+2)} < 0 \qquad 2^{3x} - 2^{2x}\cdot 4 < 0$$

$$4\cdot 2^{3x} - 2^{2x}\cdot 2^4 < 0 \qquad t = 2^x$$

$$t^3 - 4t^2 < 0$$

$$\cancel{t^2}(t-4) < 0$$

$$t - 4 < 0 \Rightarrow t < 4$$

perché t^2 è sempre > 0

$$2^x < 2^2$$

$$\boxed{x < 2}$$

RISOLUZIONE DI LUCIA

$$4\cdot 2^{3x} - 4^{x+2} < 0$$

$$2^2\cdot 2^{3x} < 2^{2(x+2)}$$

$$2^{2+3x} < 2^{2(x+2)} \rightarrow 2 + 3x < 2(x+2)$$

$$2 + 3x < 2x + 4$$

$$\boxed{x < 2}$$

148)

$$\frac{35}{2}\left(\frac{1}{5}\right)^{2x} \geq 0{,}7 \cdot 5^{x}$$

$$5\,\frac{3\cancel{5}}{\cancel{2}}\left(\frac{1}{5}\right)^{2x} \geq \frac{\cancel{7}}{\cancel{10}\,5} \cdot 5^{x}$$

$$5 \cdot \left(\frac{1}{5}\right)^{2x} \geq \frac{5^{x}}{5}$$

$$5 \cdot 5^{-2x} \geq 5^{x} \cdot 5^{-1}$$

$$5^{1-2x} \geq 5^{x-1}$$

$$1-2x \geq x-1$$

$$-3x \geq -2 \qquad \boxed{x \leq \frac{2}{3}}$$

149)

$$2 \cdot 3^{2x-1} + 9^{x+1} - 3^{2x+1} \leq \frac{60}{\sqrt[5]{3}}$$

$$2 \cdot 3^{2x} \cdot 3^{-1} + 3^{2(x+1)} - 3^{2x} \cdot 3 \leq \frac{60}{\sqrt[5]{3}}$$

$$\frac{2}{3} \cdot 3^{2x} + 3^{2x} \cdot 3^{2} - 3^{2x} \cdot 3 \leq \frac{60}{\sqrt[5]{3}} \qquad t = 3^{2x}$$

$$\frac{2}{3}t + 9t - 3t \leq \frac{60}{\sqrt[5]{3}}$$

$$\frac{2t + 27t - 9t}{3} \leq \frac{60}{\sqrt[5]{3}}$$

$$\frac{\cancel{20}t}{3} \leq \frac{\overset{3}{\cancel{60}}}{\sqrt[5]{3}} \qquad t \leq \frac{3^{2}}{3^{1/5}} \qquad t \leq 3^{2-\frac{1}{5}}$$

$$3^{2x} \leq 3^{2-\frac{1}{5}} \qquad 2x \leq 2-\frac{1}{5} \qquad 2x \leq \frac{9}{5} \qquad \boxed{x \leq \frac{9}{10}}$$