

$$2^{4x} \cdot 2^3 + 2 - 17 \cdot 4^x = 0$$

$$(2^2)^{2x} \cdot 8 - 17 \cdot 4^x + 2 = 0$$

$$8 \cdot (4^x)^2 - 17 \cdot 4^x + 2 = 0$$

$$4^x = t$$

$$8t^2 - 17t + 2 = 0$$

$$\Delta = 289 - 64 = 225 = 15^2$$

$$t = \frac{17 \pm 15}{16} = \begin{cases} \frac{32}{16} = 2 \\ \frac{2}{16} = \frac{1}{8} \end{cases}$$

$$4^x = 2$$

v

$$4^x = \frac{1}{8}$$

$$4^x = 4^{\frac{1}{2}}$$

$$2^{2x} = 2^{-3}$$

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

$$2x = -3$$

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

$$\boxed{x = \frac{1}{2} \vee x = -\frac{3}{2}}$$

$$5^{x+2} - 4 \cdot 5^{1-x} - 30 = -5^{2-x}$$

[0; -1]

$$5^x \cdot 5^2 - 4 \cdot 5 \cdot 5^{-x} - 30 = -5^2 \cdot 5^{-x}$$

$$25 \cdot 5^x - 20 \cdot \frac{1}{5^x} - 30 + 25 \cdot \frac{1}{5^x} = 0 \quad 5^x = t$$

$$25t - \frac{20}{t} - 30 + \frac{25}{t} = 0 \quad t \neq 0$$

$$25t + \frac{5}{t} - 30 = 0$$

$$5t + \frac{1}{t} - 6 = 0$$

$$\frac{5t^2 - 6t + 1}{t} = 0$$

$$t = \frac{3 \pm 2}{5} = \begin{cases} \frac{1}{5} \\ 1 \end{cases}$$

$$5^x = \frac{1}{5}$$

$$5^x = 1$$

$x = -1$
✓
$x = 0$

$$\frac{\Delta}{4} = 9 - 5 = 4$$

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$$\frac{4}{2^x - 1} + \frac{3}{2^x + 1} = 5$$

[1]

$$2^x = t$$

$$\frac{4}{t-1} + \frac{3}{t+1} = 5$$

$$t \neq \pm 1$$

$$\frac{4(t+1) + 3(t-1)}{(t-1)(t+1)} = \frac{5 \overbrace{(t-1)(t+1)}^{t^2-1}}{(t-1)(t+1)}$$

$$4t + 4 + 3t - 3 = 5t^2 - 5$$

$$5t^2 - 7t - 6 = 0 \quad \Delta = 49 + 120 = 169 = 13^2$$

$$t = \frac{7 \pm 13}{10} = \begin{cases} 2 \\ -\frac{4}{10} = -\frac{2}{5} \end{cases} \Rightarrow 2^x = 2 \Rightarrow \boxed{x=1}$$

$\Rightarrow 2^x = -\frac{2}{5}$
IMPOSSIBLE

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$$2^x + 2^{x+1} = -2^{x-1} + 7$$

[1]

$$2^x + 2^x \cdot 2 = -2^x \cdot 2^{-1} + 7$$

$$2^x + 2 \cdot 2^x = -2^x \cdot \frac{1}{2} + 7$$

$$2^x + 2 \cdot 2^x + 2^x \cdot \frac{1}{2} = 7$$

$$2^x \left(1 + 2 + \frac{1}{2} \right) = 7$$

$$2^x \cdot \frac{7}{2} = 7$$

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

$$2^x = 2$$

$$\boxed{x=1}$$

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$$\begin{cases} 36 \cdot 6^{x-y} = 6^{2x} \\ 49^x \cdot \sqrt{7^y} = 1 \end{cases}$$

$$\left[\left(-\frac{2}{3}, \frac{8}{3} \right) \right]$$

$$\begin{cases} 6^2 \cdot 6^{x-y} = 6^{2x} \\ 7^{2x} \cdot 7^{\frac{y}{2}} = 7^0 \end{cases} \quad \begin{cases} 6^{2+x-y} = 6^{2x} \\ 7^{2x+\frac{y}{2}} = 7^0 \end{cases} \quad \begin{cases} 2+x-y = 2x \\ 2x + \frac{y}{2} = 0 \end{cases}$$

$$\begin{cases} y = 2+x-2x = 2-x \\ 2x + \frac{2-x}{2} = 0 \end{cases} \quad \begin{cases} // \\ 4x + 2 - x = 0 \end{cases} \quad \begin{cases} // \\ 3x = -2 \end{cases}$$

$$\begin{cases} y = 2-x = 2 + \frac{2}{3} = \frac{8}{3} \\ x = -\frac{2}{3} \end{cases}$$

$$\boxed{\begin{cases} x = -\frac{2}{3} \\ y = \frac{8}{3} \end{cases}}$$

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$$\frac{\sqrt{3^x}}{\sqrt{3^{x+1} \cdot 9^{x+2}}} = \frac{1}{9}$$

$$\left[-\frac{5}{4} \right]$$

$$\frac{3^{\frac{x}{2}}}{3^{\frac{x+1}{2}} \cdot 3^{2x+4}} = 3^{-2}$$

$$3^{\frac{x}{2} - \frac{x+1}{2} - (2x+4)} = 3^{-2}$$

$$\frac{x}{2} - \frac{x+1}{2} - 2x - 4 = -2$$

$$\frac{\cancel{x} - \cancel{x} - 1 - 4x - 8}{2} = \frac{-4}{2}$$

$$-4x = 5$$

$$\boxed{x = -\frac{5}{4}}$$

$$\frac{\sqrt{3} \cdot \sqrt{9^x}}{81^{x-1}} = 9^{2x+3}$$

$$\left[-\frac{1}{5}\right]$$

$$\frac{\left(3 \cdot 9^{\frac{x}{2}}\right)^{\frac{1}{2}}}{3^{4(x-1)}} = 3^{2(2x+3)}$$

$$\frac{\left(3 \cdot 3^x\right)^{\frac{1}{2}}}{3^{4x-4}} = 3^{4x+6}$$

$$\frac{3^{\frac{1+x}{2}}}{3^{4x-4}} = 3^{4x+6}$$

$$3^{\frac{1+x}{2} - 4x + 4} = 3^{4x+6}$$

$$\frac{1+x}{2} - 4x + 4 = 4x + 6$$

$$\frac{1+x-8x+8}{\cancel{2}} = \frac{8x+12}{\cancel{2}}$$

$$15x = -3$$

$$x = -\frac{3}{15} = -\frac{1}{5}$$

$$\begin{cases} 2x + y = 3 \\ 2^{x-y} = 64 \end{cases}$$

 $[(3; -3)]$

$$\begin{cases} y = 3 - 2x \\ 2^{x-3+2x} = 2^6 \end{cases} \quad \begin{cases} // \\ 2^{3x-3} = 2^6 \end{cases} \quad \begin{cases} // \\ 3x-3 = 6 \end{cases}$$

$$\begin{cases} // \\ 3x = 9 \end{cases}$$

$$\begin{cases} y = 3 - 6 = -3 \\ x = 3 \end{cases}$$

$$\boxed{\begin{cases} x = 3 \\ y = -3 \end{cases}}$$