d) $4^x + 4 = 5 \cdot 2^x \Rightarrow (2^2)^x + 4 = 5 \cdot 2^x \Rightarrow$

$\Rightarrow (2^x)^2 + 4 = 5 \cdot 2^x \Rightarrow K^2 + 4 = 5 \cdot K \Rightarrow K^2 + 4 - 5K$

$2^x = K$

$$\Rightarrow K^2 - 5K + 4 = 0$$

$$\Delta = (-5)^2 - 4 \cdot 1 \cdot 4$$

$$\Delta = 25 - 16$$

$$\Delta = 9 \qquad \Delta > 0 \quad (x_1 \neq x_2)$$

$$K = \frac{5 \pm 3}{2} \begin{array}{l} \nearrow K_1 = 4 \\ \searrow K_2 = 1 \end{array}$$

para $K = 4$ \qquad\qquad para $K = 1$

$2^x = 4$ \qquad $x = 2$ \qquad\qquad $2^x = 1$

$2^x = 2^2 \Rightarrow$ \qquad\qquad\qquad $2^x = 2^0$

\qquad\qquad\qquad\qquad\qquad\qquad $x = 0$

$$S = \{0, 2\}$$

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i) $4^{x+1} + 4^{3-x} = 257 \Rightarrow 4^x \cdot 4^1 + 4^3 \cdot 4^{-x} = 257$

$\Rightarrow 4^x \cdot 4 + \dfrac{4^3}{4^x} = 257 \Rightarrow K \cdot 4 + \dfrac{4^3}{K} = 257 \cdot K$

$4^x = K$ \qquad\qquad\qquad\qquad K^x

$4K^2 + 4^3 - 257K = 0$ \qquad\qquad $4^x = 64$

\qquad\qquad\qquad\qquad\qquad\qquad\qquad $4^x = 4^3$

$K_1 = 64$ \qquad $K = \dfrac{2}{8}$ \qquad\qquad $\boxed{x = 3}$

\qquad\qquad\qquad\qquad\qquad\qquad $4^x = \dfrac{2}{8} \Rightarrow 2^x = \dfrac{1}{2^2}$

\qquad\qquad\qquad\qquad\qquad\qquad $2^{2x} = \dfrac{1}{4} \qquad 2^x = 2^{-2}$

\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad $\boxed{x = -2}$