

$$4^{x+3} = 8^{2-x}$$

$$(2^2)^{x+3} = (2^3)^{2-x}$$

$$2^{2x+6} = 2^{6-3x}$$

$$2x+6 = 6-3x$$

$$5x = 0$$

$$x = 0$$

$$x^4 + x^3 - 9x^2 - 9x = 0$$

$$x(x^3 + x^2 - 9x - 9) = 0 \quad x = 0$$

$$x^3 + x^2 - 9x - 9 = 0$$

$$\begin{array}{r|rrrr} & 1 & 1 & -9 & -9 \\ -1 & & -1 & 0 & 9 \\ \hline & 1 & 0 & -9 & 0 \end{array} \quad x = -1$$

$$x^2 - 9 = 0 \rightarrow x^2 = 9 \rightarrow x = \pm 3$$