

TEMA 6: ECUACIONES: Ecuaciones Irracionales

$$\begin{aligned} 1. \quad & (\sqrt{2x+1})^2 = (x-1)^2 \\ & 2x+1 = x^2+1-2x \\ & x^2-4x=0 \\ & x(x-4)=0 \\ & x=0 \quad \text{ó} \quad x=4 \end{aligned}$$

$$\begin{aligned} 2. \quad & (3\sqrt{2x-1})^2 = (3x)^2 \\ & 9(2x-1) = 9x^2 \\ & 18x-9 = 9x^2 \\ & 9x^2-18x+9=0 \\ & x = \frac{18 \pm \sqrt{324-324}}{18} = 1 \end{aligned}$$

$$\begin{aligned} 3. \quad & 3-2x = \sqrt{2x+3} \\ & (3-2x)^2 = (\sqrt{2x+3})^2 \\ & 9+4x^2-12x = 2x+3 \\ & 4x^2-14x+6=0 \\ & x = \frac{14 \pm \sqrt{196-96}}{8} = \\ & = \frac{14 \pm 10}{8} = \begin{cases} 3 \\ 1/2 \end{cases} \end{aligned}$$

No es solución
Sí es solución

$$\begin{aligned} 4. \quad & (\sqrt{x}+x)^2 = (\sqrt{3x+x^2})^2 \\ & x+x^2+2x\sqrt{x} = 3x+x^2 \\ & 2x\sqrt{x} = 2x \\ & (2x\sqrt{x})^2 = (2x)^2 \\ & 4x^2x = 4x^2 \quad x^2(x-1)=0 \\ & x^3 = x^2 \quad x=0 \quad \text{ó} \quad x=1 \end{aligned}$$

$$\begin{aligned} 5. \quad & (a+b)^2 = a^2+b^2+2ab \\ & (\sqrt{x+5}+\sqrt{2x+8})^2 = 7^2 \\ & x+5+2x+8+2\sqrt{(x+5)(2x+8)} = 49 \\ & 2\sqrt{(x+5)(2x+8)} = 49-13-3x \\ & 2\sqrt{(x+5)(2x+8)} = 36-3x \\ & (2\sqrt{(x+5)(2x+8)})^2 = (36-3x)^2 \\ & 4(x+5)(2x+8) = 1296+9x^2-216x \\ & 4(2x^2+8x+10x+40) = 1296+9x^2-216x \\ & 8x^2+32x+40x+160 = 1296+9x^2-216x \end{aligned}$$

$$\begin{aligned} & x^2-288x+1136=0 \\ & x = \frac{288 \pm \sqrt{82944-4544}}{2} = \\ & = \frac{288 \pm \sqrt{78400}}{2} = \\ & = \frac{288 \pm 280}{2} = \begin{cases} 284 \\ 4 \end{cases} \end{aligned}$$

284 No es solución
4 Sí es solución

$$\begin{aligned} 6. \quad & (\sqrt{x^2+1+2\sqrt{4x-3}})^2 = (x+1)^2 \\ & x^2+1+2\sqrt{4x-3} = x^2+2x+1 \\ & 2\sqrt{4x-3} = 2x \\ & 2^2\sqrt{4x-3}^2 = 4x^2 \\ & 4(4x-3) = 4x^2 \\ & 16x-12 = 4x^2 \\ & x = 1, 3 \end{aligned}$$

$$\begin{aligned} 7. \quad & \sqrt[3]{x^2-x+6} = 2 \\ & \sqrt[3]{x^2-x+6}^3 = 2^3 \quad x=-1 \rightarrow \sqrt[3]{8}-2=2-2=0 \\ & x^2-x+6=8 \quad x=2 \rightarrow \sqrt[3]{8}-2=2-2=0 \\ & x^2-x-2=0 \\ & x = -1, 2 \end{aligned}$$

$$\begin{aligned} 8. \quad & \sqrt{3x+10}+1 = 6-3\sqrt{x+3} \\ & \sqrt{3x+10}-5 = -3\sqrt{x+3} \\ & (\sqrt{3x+10}-5)^2 = (-3\sqrt{x+3})^2 \\ & 3x+10+25-10\sqrt{3x+10} = 9(x+3) \\ & -6x+8 = 10\sqrt{3x+10} \\ & (-6x+8)^2 = 10^2\sqrt{3x+10}^2 \\ & 36x^2+64-96x = 300x+1000 \\ & x = -2, 13 \end{aligned}$$