

$$178 \quad \left(\frac{x}{2} - 1\right)\left(\frac{x}{2} + 1\right) = 2\left(\frac{x}{2} + 1\right)^2$$

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

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

$$\frac{x^2 - 4}{4} = \frac{2x^2 + 8x + 8}{4}$$

$$-x^2 - 8x - 12 = 0$$

$$x^2 + 8x + 12 = 0$$

$$\Delta = b^2 - 4ac = 64 - 4 \cdot 1 \cdot 12 = 16$$

$$x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-8 \pm \sqrt{16}}{2} =$$

$$= \frac{-8 \pm 4}{2} = \begin{cases} \frac{-8-4}{2} = -6 \\ \frac{-8+4}{2} = -2 \end{cases}$$

$$\boxed{x = -6 \vee x = -2}$$

$$193 \quad (x - \sqrt{3})^2 + x(x - \sqrt{3}) = 9$$

$$x^2 - 2\sqrt{3}x + 3 + x^2 - \sqrt{3}x - 9 = 0$$

$$2x^2 - 3\sqrt{3}x - 6 = 0$$

$$\Delta = b^2 - 4ac = (-3\sqrt{3})^2 + 48 =$$

$$= 27 + 48 = 75$$

$$x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{3\sqrt{3} \pm \sqrt{75}}{4} = \frac{3\sqrt{3} \pm 5\sqrt{3}}{4} = \begin{cases} \frac{-2\sqrt{3}}{4} = -\frac{\sqrt{3}}{2} \\ \frac{8\sqrt{3}}{4} = 2\sqrt{3} \end{cases}$$

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

$$\boxed{227} \quad \frac{x-1}{\sqrt{2}} + \frac{(x-1)^2}{\sqrt{2}-1} = \frac{x^2-1}{\sqrt{2}+1}$$

$$\frac{\overbrace{(2-1)}^1 (x-1) + \sqrt{2}(\sqrt{2}+1)(x-1)^2}{\sqrt{2}(\sqrt{2}-1)(\sqrt{2}+1)} = \frac{\sqrt{2}(\sqrt{2}-1)(x^2-1)}{\sqrt{2}(\sqrt{2}-1)(\sqrt{2}+1)}$$

$$x-1 + (2+\sqrt{2})(x^2-2x+1) = (\sqrt{2}-1)(x^2-1)$$

$$x-1 + \cancel{2x^2} - 4x + 2 + \sqrt{2}x^2 - 2\sqrt{2}x + \cancel{\sqrt{2}} = \cancel{2x^2} - 2 - \sqrt{2}x^2 + \cancel{\sqrt{2}}$$

$$\sqrt{2}x^2 + \sqrt{2}x^2 + x - 4x - 2\sqrt{2}x - 1 + 2 + 2 = 0$$

$$2\sqrt{2}x^2 - (3+2\sqrt{2})x + 3 = 0$$

$$a = 2\sqrt{2}$$

$$b = -(3+2\sqrt{2})$$

$$c = 3$$

$$\Delta = (3+2\sqrt{2})^2 - 4 \cdot 2\sqrt{2} \cdot 3 =$$

$$= 9 + 8 + 12\sqrt{2} - 24\sqrt{2} =$$

$$= 9 + 8 - 12\sqrt{2} = (3-2\sqrt{2})^2$$

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

$$= \frac{\cancel{3}+2\sqrt{2} - \cancel{3}+2\sqrt{2}}{4\sqrt{2}} = \frac{4\sqrt{2}}{4\sqrt{2}} = 1$$

$$= \frac{\cancel{3}+2\sqrt{2} + \cancel{3}-2\sqrt{2}}{4\sqrt{2}} = \frac{3}{2 \cdot 4\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{3\sqrt{2}}{4}$$

$$\boxed{x=1 \vee x = \frac{3\sqrt{2}}{4}}$$