

$$1.a) 0,001^{-\frac{2}{3}} = \left(\frac{1}{1000}\right)^{-\frac{2}{3}} = \frac{1}{1000^{-\frac{2}{3}}} = 1000^{\frac{2}{3}} = (2^3 \cdot 5^3)^{\frac{2}{3}} = 2^2 \cdot 5^2 = 100$$

$$b) 2\sqrt{63} - \sqrt{28} + \sqrt{175} = 2\sqrt{3^2 \cdot 7} - \sqrt{2^2 \cdot 7} + \sqrt{5^2 \cdot 7} = 2 \cdot 3\sqrt{7} - 2\sqrt{7} + 5\sqrt{7} = (6 - 2 + 5)\sqrt{7} = 9\sqrt{7}$$

$$c) \frac{\sqrt[3]{5^2} \times \sqrt[4]{5}}{\sqrt{5^3}} = \frac{5^{\frac{2}{3}} \cdot 5^{\frac{1}{4}}}{5^{\frac{3}{2}}} = 5^{\frac{2}{3} + \frac{1}{4} - \frac{3}{2}} = 5^{\frac{8}{12} + \frac{3}{12} - \frac{18}{12}} = 5^{-\frac{7}{12}} = \frac{1}{5^{\frac{7}{12}}} = \frac{1}{\sqrt[12]{5^7}} = \frac{\sqrt[12]{5^5}}{\sqrt[12]{5^7 \cdot 5^2}} = \frac{\sqrt[12]{5^5}}{5}$$

$$d) \frac{1}{2} \log 4 + 3 \log 2 - 2 \log 5 = \log 4^{\frac{1}{2}} + \log 2^3 - \log 5^2 = \log \frac{4^{\frac{1}{2}} \cdot 2^3}{5^2} = \log \frac{\sqrt{4} \cdot 8}{25} = \log \frac{16}{25} =$$

$$= \log \frac{4^2}{5^2} = \log \left(\frac{4}{5}\right)^2 = 2 \log \frac{4}{5}$$

2.

$$\begin{array}{r} 3x^2 \\ 3x^2 \quad -6x \\ \hline 6x \\ 6x \quad -12 \\ \hline 12 \end{array} \quad \begin{array}{r} | \quad x - 2 \\ 3x + 6 \end{array} \quad \frac{3x^2}{x-2} = 3x + 6 + \frac{12}{x-2}$$

$$3.a) \frac{x^2 - 8x + 16}{x^2 - 3x - 4} = \frac{(x-4)^2}{(x+1)(x-4)} = \frac{x-4}{x+1}$$

$$r_{1,2} = \frac{-(-3) \pm \sqrt{3^2 - 4 \times 1 \times (-4)}}{2 \times 1} = \frac{3 \pm \sqrt{9+16}}{2} = \frac{3 \pm \sqrt{25}}{2} = \frac{3 \pm 5}{2} \Rightarrow r_1 = -1 \text{ e } r_2 = 4$$

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

$$c) \frac{x-2}{x^2-1} \cdot \frac{x+1}{x^2-2x} = \frac{(x-2)(x+1)}{(x-1)(x+1) \cdot x(x-2)} = \frac{1}{x(x-1)}$$

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

$$4.a) x - 5 = -\frac{6}{x} \Rightarrow (x-5)x = -6 \Rightarrow x^2 - 5x + 6 = 0$$

$$r_{1,2} = \frac{-(-5) \pm \sqrt{5^2 - 4 \times 1 \times 6}}{2 \times 1} = \frac{5 \pm \sqrt{25 - 24}}{2} = \frac{5 \pm \sqrt{1}}{2} = \frac{5 \pm 1}{2} \Rightarrow r_1 = 2 \text{ e } r_2 = 3$$

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

$$\Rightarrow 2x^2 - 2x + 2 = 3x(x-1) \Rightarrow 2x^2 - 2x + 2 = 3x^2 - 3x \Rightarrow 2x^2 - 2x + 2 - 3x^2 + 3x = 0 \Rightarrow$$

$$\Rightarrow -x^2 + x + 2 = 0 \Rightarrow x^2 - x - 2 = 0$$

$$r_{1,2} = \frac{-(-1) \pm \sqrt{1^2 - 4 \times 1 \times (-2)}}{2 \times 1} = \frac{1 \pm \sqrt{9}}{2} = \frac{1 \pm 3}{2} \Rightarrow r_1 = -1 \text{ e } r_2 = 2$$

$$c) \frac{x}{x+1} - \frac{x+1}{x} = 1 - \frac{1}{x^2+x} \Rightarrow \frac{x \cdot x - (x+1)(x+1)}{x(x+1)} = \frac{x^2+x-1}{x(x+1)} \Rightarrow x^2 - (x+1)(x+1) = x^2 + x - 1 \Rightarrow$$

$$\Rightarrow x^2 - x^2 - x - x - 1 - x^2 - x + 1 = 0 \Rightarrow -x^2 - 3x = 0 \Rightarrow -x(x+3) = 0 \Rightarrow$$

$$\Rightarrow x+3 = 0 \Rightarrow x = -3$$