

$$1. \frac{4+\sqrt{3}+\sqrt{5}}{16-4\sqrt{15}} \cdot (\sqrt{7-\sqrt{3}} - \sqrt{3+\sqrt{5}}) (\sqrt{7-\sqrt{3}} + \sqrt{3+\sqrt{5}})$$

$$\frac{4+\sqrt{3}+\sqrt{5}}{4(4-\sqrt{15})} \cdot (7-\sqrt{3}-3-\sqrt{5}) = \frac{[4+(\sqrt{3}+\sqrt{5})][4-(\sqrt{3}+\sqrt{5})]}{4(4-\sqrt{15})} = \frac{16-(3+5+2\sqrt{15})}{4(4-\sqrt{15})} = \frac{2(4-\sqrt{15})}{4(4-\sqrt{15})} = \frac{1}{2}$$

$$2. \frac{1}{\sqrt{3}-\sqrt{2}} - \sqrt{2} + (\sqrt{3}-2)^3 - (\sqrt{3}+2)^3$$

$$\frac{\sqrt{3}+\sqrt{2}}{3-2} - \sqrt{2} + 3\sqrt{3} - 18 + 12\sqrt{3} - 8 - (3\sqrt{3} + 18 + 12\sqrt{3} + 8) =$$

$$= \sqrt{3} + \sqrt{2} - \sqrt{2} + 3\sqrt{3} - 18 + 12\sqrt{3} - 8 - 3\sqrt{3} - 18 - 12\sqrt{3} - 8 = \sqrt{3} - 52$$

$$3. \frac{\sqrt{6}-\sqrt{3}+2\sqrt{2}-2}{\sqrt{3}+2} - \frac{2\sqrt{6}-\sqrt{3}-8\sqrt{2}+4}{\sqrt{3}-4} + \sqrt{2}$$

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

$$= \sqrt{2} - 1 - 2\sqrt{2} + 1 + \sqrt{2} = 0$$

$$4. [(\sqrt{a})^3 \cdot \sqrt{ab} : \sqrt[3]{a}]^2 \cdot \sqrt[3]{b\sqrt{a}} : \frac{\sqrt{a^3}}{\sqrt[3]{b^2}} \cdot \sqrt{\frac{1}{a^3} \sqrt[4]{ab} \sqrt{\frac{a^6}{b^2}}}$$

$$[\sqrt{a^4 b} : \sqrt[3]{a}]^2 \cdot \sqrt[6]{ab^2} \cdot \frac{\sqrt[3]{b^2}}{\sqrt{a^3}} \cdot \sqrt{\frac{1}{a^3} \sqrt[4]{ab} \cdot \frac{a^3}{b}} = \left[\sqrt{\frac{a^{12} b^3}{a^2}} \right]^2 \cdot \sqrt[6]{ab^2} \cdot \sqrt[6]{\frac{b^4}{a^9}} \cdot \sqrt{\frac{1}{a^3} \cdot a} =$$

$$= \sqrt[6]{a^{20} b^6} \cdot \sqrt[6]{\frac{b^6}{a^8}} \cdot \frac{1}{a} = \sqrt[6]{a^{12} b^{12}} \cdot \frac{1}{a} = \sqrt[6]{(a^2 b^2)^6} \cdot \frac{1}{a} = \frac{a^2 b^2}{a} = ab^2 \quad C.E.: \begin{cases} a > 0 \\ b > 0 \end{cases}$$

$$5. \left[14\sqrt{a} : (2\sqrt{a}) - 5 \frac{\sqrt[4]{a^2-4a+4}}{\sqrt{a-2}} + \sqrt{a-3} \right] (2 - \sqrt[4]{a^2+9-6a}) + 3 \sqrt[8]{\left(\frac{a^2}{9}\right)^3 \cdot \left(\frac{a}{3}\right)^2}$$

$$\left[7 - 5 \frac{\sqrt[4]{(a-2)^2}}{\sqrt{a-2}} + \sqrt{a-3} \right] (2 - \sqrt[4]{(a-3)^2}) + 3 \sqrt[8]{\frac{a^6}{3^6} \cdot \frac{a^2}{3^2}} = \quad C.E.: \begin{cases} a > 0 \\ a > 2 \\ a \geq 3 \end{cases} \quad a \geq 3$$

$$= [7 - 5 + \sqrt{a-3}] (2 - \sqrt{a-3}) + 3 \sqrt[8]{\frac{a^8}{3^8}} = (2 + \sqrt{a-3})(2 - \sqrt{a-3}) + 3 \cdot \frac{a}{3} = 4 - a + 3 + a = 7$$

$$6. \sqrt[4]{(\sqrt{-a}+a)(a-\sqrt{-a}) + (1+\sqrt{-a})^2 - (\sqrt{2\sqrt{-a}})^2 - (\sqrt[3]{-2a})^3}$$

$$\sqrt[4]{a^2 - (-a) + 1 + (-a) + 2\sqrt{-a} - 2\sqrt{-a} + 2a} = \sqrt[4]{a^2 + a + 1 - a + 2a} = \sqrt[4]{a^2 + 2a + 1} = \sqrt[4]{(a+1)^2} =$$

$$= \sqrt{|a+1|} \quad C.E.: -a \geq 0 \quad a \leq 0$$