

2 重根号クイズ

1 次の式を簡単にせよ。

(1) $\sqrt{7+2\sqrt{10}}$ (2) $\sqrt{12-6\sqrt{3}}$ (3) $\sqrt{3+\sqrt{5}}$

解答 (1) $\sqrt{5}+\sqrt{2}$ (2) $3-\sqrt{3}$ (3) $\frac{\sqrt{10}+\sqrt{2}}{2}$

解説

(1) $\sqrt{7+2\sqrt{10}} = \sqrt{(5+2)+2\sqrt{5\cdot 2}} = \sqrt{5} + \sqrt{2}$
(2) $\sqrt{12-6\sqrt{3}} = \sqrt{12-2\sqrt{27}} = \sqrt{(9+3)-2\sqrt{9\cdot 3}} = \sqrt{9} - \sqrt{3} = 3 - \sqrt{3}$
(3) $\sqrt{3+\sqrt{5}} = \sqrt{\frac{6+2\sqrt{5}}{2}} = \frac{\sqrt{6+2\sqrt{5}}}{\sqrt{2}} = \frac{\sqrt{(5+1)+2\sqrt{5\cdot 1}}}{\sqrt{2}} = \frac{\sqrt{5}+1}{\sqrt{2}} = \frac{\sqrt{10}+\sqrt{2}}{2}$

2 次の式を簡単にせよ。

(1) $\sqrt{7+2\sqrt{10}}$ (2) $\sqrt{12-6\sqrt{3}}$ (3) $\sqrt{2+\sqrt{3}}$

解答 (1) $\sqrt{5}+\sqrt{2}$ (2) $3-\sqrt{3}$ (3) $\frac{\sqrt{6}+\sqrt{2}}{2}$

解説

(1) $\sqrt{7+2\sqrt{10}} = \sqrt{(5+2)+2\sqrt{5\cdot 2}} = \sqrt{5} + \sqrt{2}$
(2) $\sqrt{12-6\sqrt{3}} = \sqrt{12-2\sqrt{27}} = \sqrt{(9+3)-2\sqrt{9\cdot 3}} = \sqrt{9} - \sqrt{3} = 3 - \sqrt{3}$
(3) $\sqrt{2+\sqrt{3}} = \sqrt{\frac{4+2\sqrt{3}}{2}} = \frac{\sqrt{4+2\sqrt{3}}}{\sqrt{2}} = \frac{\sqrt{(3+1)+2\sqrt{3\cdot 1}}}{\sqrt{2}} = \frac{\sqrt{3}+\sqrt{1}}{\sqrt{2}} = \frac{\sqrt{6}+\sqrt{2}}{2}$

3 次の式を簡単にせよ。

(1) $\sqrt{9+2\sqrt{14}}$ (2) $\sqrt{13-2\sqrt{30}}$
(3) $\sqrt{8+4\sqrt{3}}$ (4) $\sqrt{14-6\sqrt{5}}$

解答 (1) $\sqrt{7}+\sqrt{2}$ (2) $\sqrt{10}-\sqrt{3}$ (3) $\sqrt{6}+\sqrt{2}$ (4) $3-\sqrt{5}$

解説

(1) $\sqrt{9+2\sqrt{14}} = \sqrt{(7+2)+2\sqrt{7\cdot 2}} = \sqrt{7} + \sqrt{2}$
(2) $\sqrt{13-2\sqrt{30}} = \sqrt{(10+3)-2\sqrt{10\cdot 3}} = \sqrt{10} - \sqrt{3}$
(3) $\sqrt{8+4\sqrt{3}} = \sqrt{8+2\sqrt{2^2\cdot 3}} = \sqrt{8+2\sqrt{12}} = \sqrt{(6+2)+2\sqrt{6\cdot 2}} = \sqrt{6} + \sqrt{2}$
(4) $\sqrt{14-6\sqrt{5}} = \sqrt{14-2\sqrt{3^2\cdot 5}} = \sqrt{14-2\sqrt{45}} = \sqrt{(9+5)-2\sqrt{9\cdot 5}} = \sqrt{9} - \sqrt{5} = 3 - \sqrt{5}$

4 次の式の2重根号をはずして簡単にせよ。

(1) $\sqrt{8+2\sqrt{15}}$ (2) $\sqrt{8-2\sqrt{15}}$
(3) $\sqrt{7+4\sqrt{3}}$ (4) $\sqrt{3-\sqrt{5}}$

解答 (1) $\sqrt{5}+\sqrt{3}$ (2) $\sqrt{5}-\sqrt{3}$ (3) $2+\sqrt{3}$ (4) $\frac{\sqrt{10}-\sqrt{2}}{2}$

解説

(1) $\sqrt{8+2\sqrt{15}} = \sqrt{(5+3)+2\sqrt{5\cdot 3}} = \sqrt{5} + \sqrt{3}$
(2) $\sqrt{8-2\sqrt{15}} = \sqrt{(5+3)-2\sqrt{5\cdot 3}} = \sqrt{5} - \sqrt{3}$
(3) $\sqrt{7+4\sqrt{3}} = \sqrt{7+2\sqrt{4\cdot 3}} = \sqrt{(4+3)+2\sqrt{4\cdot 3}} = \sqrt{4} + \sqrt{3} = 2 + \sqrt{3}$
(4) $\sqrt{3-\sqrt{5}} = \sqrt{\frac{6-2\sqrt{5}}{2}} = \frac{\sqrt{(5+1)-2\sqrt{5\cdot 1}}}{\sqrt{2}} = \frac{\sqrt{5}-1}{\sqrt{2}} = \frac{(\sqrt{5}-1)\sqrt{2}}{\sqrt{2}\sqrt{2}} = \frac{\sqrt{10}-\sqrt{2}}{2}$

5 次の式の2重根号をはずして簡単にせよ。

(1) $\sqrt{28+10\sqrt{3}}$ (2) $\sqrt{10-\sqrt{84}}$
(3) $\sqrt{2-\sqrt{3}}$ (4) $\sqrt{9-3\sqrt{5}}$

解答 (1) $5+\sqrt{3}$ (2) $\sqrt{7}-\sqrt{3}$ (3) $\frac{\sqrt{6}-\sqrt{2}}{2}$ (4) $\frac{\sqrt{30}-\sqrt{6}}{2}$

解説

(1) $\sqrt{28+10\sqrt{3}} = \sqrt{28+2\sqrt{5^2\cdot 3}} = \sqrt{28+2\sqrt{75}} = \sqrt{(25+3)+2\sqrt{25\cdot 3}} = \sqrt{25} + \sqrt{3} = 5 + \sqrt{3}$
(2) $\sqrt{10-\sqrt{84}} = \sqrt{10-2\sqrt{21}} = \sqrt{(7+3)-2\sqrt{7\cdot 3}} = \sqrt{7} - \sqrt{3}$
(3) $\sqrt{2-\sqrt{3}} = \sqrt{\frac{4-2\sqrt{3}}{2}} = \frac{\sqrt{(3+1)-2\sqrt{3\cdot 1}}}{\sqrt{2}} = \frac{\sqrt{3}-1}{\sqrt{2}} = \frac{(\sqrt{3}-1)\sqrt{2}}{(\sqrt{2})^2} = \frac{\sqrt{6}-\sqrt{2}}{2}$
(4) $\sqrt{9-3\sqrt{5}} = \sqrt{9-\sqrt{45}} = \sqrt{\frac{18-2\sqrt{45}}{2}} = \frac{\sqrt{(15+3)-2\sqrt{15\cdot 3}}}{\sqrt{2}} = \frac{\sqrt{15}-\sqrt{3}}{\sqrt{2}} = \frac{(\sqrt{15}-\sqrt{3})\sqrt{2}}{(\sqrt{2})^2} = \frac{\sqrt{30}-\sqrt{6}}{2}$

6 次の式の2重根号をはずして簡単にせよ。

(1) $\sqrt{11+2\sqrt{30}}$ (2) $\sqrt{9-2\sqrt{14}}$ (3) $\sqrt{10-\sqrt{84}}$ (4) $\sqrt{6+\sqrt{35}}$

解答 (1) $\sqrt{6}+\sqrt{5}$ (2) $\sqrt{7}-\sqrt{2}$ (3) $\sqrt{7}-\sqrt{3}$ (4) $\frac{\sqrt{14}+\sqrt{10}}{2}$

解説

(1) $\sqrt{11+2\sqrt{30}} = \sqrt{(6+5)+2\sqrt{6\cdot 5}} = \sqrt{6} + \sqrt{5}$
(2) $\sqrt{9-2\sqrt{14}} = \sqrt{(7+2)-2\sqrt{7\cdot 2}} = \sqrt{7} - \sqrt{2}$
(3) $\sqrt{10-\sqrt{84}} = \sqrt{10-\sqrt{2^2\cdot 21}} = \sqrt{10-2\sqrt{21}} = \sqrt{(7+3)-2\sqrt{7\cdot 3}} = \sqrt{7} - \sqrt{3}$
(4) $\sqrt{6+\sqrt{35}} = \sqrt{\frac{12+2\sqrt{35}}{2}} = \frac{\sqrt{(7+5)+2\sqrt{7\cdot 5}}}{\sqrt{2}} = \frac{\sqrt{7}+\sqrt{5}}{\sqrt{2}} = \frac{\sqrt{2}(\sqrt{7}+\sqrt{5})}{2} = \frac{\sqrt{14}+\sqrt{10}}{2}$

7 次の式の2重根号をはずして簡単にせよ。

(1) $\sqrt{6+4\sqrt{2}}$ (2) $\sqrt{8-\sqrt{48}}$ (3) $\sqrt{2+\sqrt{3}}$ (4) $\sqrt{9-3\sqrt{5}}$

解答 (1) $2+\sqrt{2}$ (2) $\sqrt{6}-\sqrt{2}$ (3) $\frac{\sqrt{6}+\sqrt{2}}{2}$ (4) $\frac{\sqrt{30}-\sqrt{6}}{2}$

解説

(1) $\sqrt{6+4\sqrt{2}} = \sqrt{6+2\sqrt{2^2\cdot 2}} = \sqrt{(4+2)+2\sqrt{4\cdot 2}} = \sqrt{4} + \sqrt{2} = 2 + \sqrt{2}$
(2) $\sqrt{8-\sqrt{48}} = \sqrt{8-\sqrt{2^2\cdot 12}} = \sqrt{(6+2)-2\sqrt{6\cdot 2}} = \sqrt{6} - \sqrt{2}$
(3) $\sqrt{2+\sqrt{3}} = \sqrt{\frac{4+2\sqrt{3}}{2}} = \frac{\sqrt{(3+1)+2\sqrt{3\cdot 1}}}{\sqrt{2}} = \frac{\sqrt{3}+1}{\sqrt{2}} = \frac{\sqrt{6}+\sqrt{2}}{2}$
(4) $\sqrt{9-3\sqrt{5}} = \sqrt{\frac{18-6\sqrt{5}}{2}} = \frac{\sqrt{18-2\sqrt{3^2\cdot 5}}}{\sqrt{2}} = \frac{\sqrt{(15+3)-2\sqrt{15\cdot 3}}}{\sqrt{2}} = \frac{\sqrt{15}-\sqrt{3}}{\sqrt{2}} = \frac{\sqrt{30}-\sqrt{6}}{2}$

8 2重根号をはずして、次の式を簡単にせよ。

(1) $\sqrt{4+2\sqrt{3}}$ (2) $\sqrt{5-\sqrt{24}}$ (3) $\sqrt{9+4\sqrt{2}}$ (4) $\sqrt{3-\sqrt{5}}$

解答 (1) $\sqrt{3}+1$ (2) $\sqrt{3}-\sqrt{2}$ (3) $2\sqrt{2}+1$ (4) $\frac{\sqrt{10}-\sqrt{2}}{2}$

解説

(1) $\sqrt{4+2\sqrt{3}} = \sqrt{(3+1)+2\sqrt{3\cdot 1}} = \sqrt{(\sqrt{3}+\sqrt{1})^2} = \sqrt{3} + \sqrt{1} = \sqrt{3} + 1$
(2) $\sqrt{5-\sqrt{24}} = \sqrt{5-2\sqrt{6}} = \sqrt{(3+2)-2\sqrt{3\cdot 2}} = \sqrt{(\sqrt{3}-\sqrt{2})^2} = \sqrt{3} - \sqrt{2}$
(3) $\sqrt{9+4\sqrt{2}} = \sqrt{9+2\sqrt{8}} = \sqrt{(8+1)+2\sqrt{8\cdot 1}} = \sqrt{8} + \sqrt{1} = 2\sqrt{2} + 1$
(4) $\sqrt{3-\sqrt{5}} = \sqrt{\frac{6-2\sqrt{5}}{2}} = \frac{\sqrt{(5+1)-2\sqrt{5\cdot 1}}}{\sqrt{2}} = \frac{\sqrt{5}-\sqrt{1}}{\sqrt{2}} = \frac{\sqrt{10}-\sqrt{2}}{2}$

9 2重根号をはずして、次の式を簡単にせよ。

(1) $\sqrt{7+2\sqrt{6}}$ (2) $\sqrt{9-2\sqrt{14}}$ (3) $\sqrt{11+4\sqrt{6}}$ (4) $\sqrt{4-\sqrt{15}}$

解答 (1) $\sqrt{6}+1$ (2) $\sqrt{7}-\sqrt{2}$ (3) $2\sqrt{2}+\sqrt{3}$ (4) $\frac{\sqrt{10}-\sqrt{6}}{2}$

解説

(1) $\sqrt{7+2\sqrt{6}} = \sqrt{(6+1)+2\sqrt{6\cdot 1}} = \sqrt{(\sqrt{6}+\sqrt{1})^2} = \sqrt{6} + \sqrt{1} = \sqrt{6} + 1$
(2) $\sqrt{9-2\sqrt{14}} = \sqrt{(7+2)-2\sqrt{7\cdot 2}} = \sqrt{(\sqrt{7}-\sqrt{2})^2} = \sqrt{7} - \sqrt{2}$
(3) $\sqrt{11+4\sqrt{6}} = \sqrt{11+2\cdot 2\sqrt{6}} = \sqrt{11+2\sqrt{24}} = \sqrt{(8+3)+2\sqrt{8\cdot 3}} = \sqrt{8} + \sqrt{3} = 2\sqrt{2} + \sqrt{3}$
(4) $\sqrt{4-\sqrt{15}} = \sqrt{\frac{8-2\sqrt{15}}{2}} = \frac{\sqrt{(5+3)-2\sqrt{5\cdot 3}}}{\sqrt{2}} = \frac{\sqrt{5}-\sqrt{3}}{\sqrt{2}} = \frac{(\sqrt{5}-\sqrt{3})\sqrt{2}}{\sqrt{2}\cdot\sqrt{2}} = \frac{\sqrt{10}-\sqrt{6}}{2}$

10 次の式を簡単にせよ。

(1) $\sqrt{4+2\sqrt{3}}$ (2) $\sqrt{17-2\sqrt{42}}$ (3) $\sqrt{9-2\sqrt{20}}$

解答 (1) $\sqrt{3}+1$ (2) $\sqrt{14}-\sqrt{3}$ (3) $\sqrt{5}-2$

解説

(1) 与式 $= \sqrt{(3+1)+2\sqrt{3 \cdot 1}} = \sqrt{3} + \sqrt{1} = \sqrt{3} + 1$

(2) 与式 $= \sqrt{(14+3)-2\sqrt{14 \cdot 3}} = \sqrt{14} - \sqrt{3}$

(3) 与式 $= \sqrt{(5+4)-2\sqrt{5 \cdot 4}} = \sqrt{5} - \sqrt{4} = \sqrt{5} - 2$

11 次の式を簡単にせよ。

(1) $\sqrt{5+24}$ (2) $\sqrt{11+4\sqrt{6}}$ (3) $\sqrt{12-8\sqrt{2}}$

解答 (1) $\sqrt{3} + \sqrt{2}$ (2) $2\sqrt{2} + \sqrt{3}$ (3) $2\sqrt{2} - 2$

解説

(1) 与式 $= \sqrt{5+2\sqrt{6}} = \sqrt{(3+2)+2\sqrt{3 \cdot 2}} = \sqrt{3} + \sqrt{2}$

(2) 与式 $= \sqrt{11+2\sqrt{24}} = \sqrt{(8+3)+2\sqrt{8 \cdot 3}} = \sqrt{8} + \sqrt{3} = 2\sqrt{2} + \sqrt{3}$

(3) 与式 $= \sqrt{12-2\sqrt{32}} = \sqrt{(8+4)-2\sqrt{8 \cdot 4}} = \sqrt{8} - \sqrt{4} = 2\sqrt{2} - 2$

12 次の式を簡単にせよ。

(1) $\sqrt{4+\sqrt{7}}$ (2) $\sqrt{7-\sqrt{33}}$ (3) $\sqrt{10+5\sqrt{3}}$

解答 (1) $\frac{\sqrt{14}+\sqrt{2}}{2}$ (2) $\frac{\sqrt{22}-\sqrt{6}}{2}$ (3) $\frac{\sqrt{30}+\sqrt{10}}{2}$

解説

(1) 与式 $= \sqrt{\frac{8+2\sqrt{7}}{2}} = \frac{\sqrt{(7+1)+2\sqrt{7 \cdot 1}}}{\sqrt{2}} = \frac{\sqrt{7}+\sqrt{1}}{\sqrt{2}} = \frac{\sqrt{14}+\sqrt{2}}{2}$

(2) 与式 $= \sqrt{\frac{14-2\sqrt{33}}{2}} = \frac{\sqrt{(11+3)-2\sqrt{11 \cdot 3}}}{\sqrt{2}} = \frac{\sqrt{11}-\sqrt{3}}{\sqrt{2}} = \frac{\sqrt{22}-\sqrt{6}}{2}$

(3) 与式 $= \sqrt{10+\sqrt{75}} = \sqrt{\frac{20+2\sqrt{75}}{2}} = \frac{\sqrt{(15+5)+2\sqrt{15 \cdot 5}}}{\sqrt{2}} = \frac{\sqrt{15}+\sqrt{5}}{\sqrt{2}} = \frac{\sqrt{30}+\sqrt{10}}{2}$

13 次の式を簡単にせよ。

(1) $\sqrt{9+2\sqrt{14}}$ (2) $\sqrt{7-\sqrt{48}}$ (3) $\sqrt{3-\sqrt{5}}$

解答 (1) $\sqrt{7} + \sqrt{2}$ (2) $2 - \sqrt{3}$ (3) $\frac{\sqrt{10}-\sqrt{2}}{2}$

解説

(1) $\sqrt{9+2\sqrt{14}} = \sqrt{(7+2)+2\sqrt{7 \cdot 2}} = \sqrt{7} + \sqrt{2}$

(2) $\sqrt{7-\sqrt{48}} = \sqrt{7-2\sqrt{12}} = \sqrt{(4+3)-2\sqrt{4 \cdot 3}} = \sqrt{4} - \sqrt{3} = 2 - \sqrt{3}$

(3) $\sqrt{3-\sqrt{5}} = \sqrt{\frac{6-2\sqrt{5}}{2}} = \frac{\sqrt{6-2\sqrt{5}}}{\sqrt{2}} = \frac{\sqrt{(5+1)-2\sqrt{5 \cdot 1}}}{\sqrt{2}} = \frac{\sqrt{5}-\sqrt{1}}{\sqrt{2}} = \frac{\sqrt{5}-1}{\sqrt{2}} = \frac{\sqrt{10}-\sqrt{2}}{2}$

14 次の式を簡単にせよ。

(1) $\sqrt{5+\sqrt{24}}$ (2) $\sqrt{11-4\sqrt{6}}$ (3) $\sqrt{5-\sqrt{21}}$

解答 (1) $\sqrt{3} + \sqrt{2}$ (2) $2\sqrt{2} - \sqrt{3}$ (3) $\frac{\sqrt{14}-\sqrt{6}}{2}$

解説

(1) $\sqrt{5+\sqrt{24}} = \sqrt{5+2\sqrt{6}} = \sqrt{(3+2)+2\sqrt{3 \cdot 2}} = \sqrt{3} + \sqrt{2}$

(2) $\sqrt{11-4\sqrt{6}} = \sqrt{11-2\sqrt{24}} = \sqrt{(8+3)-2\sqrt{8 \cdot 3}} = \sqrt{8} - \sqrt{3} = 2\sqrt{2} - \sqrt{3}$

(3) $\sqrt{5-\sqrt{21}} = \sqrt{\frac{10-2\sqrt{21}}{2}} = \frac{\sqrt{10-2\sqrt{21}}}{\sqrt{2}} = \frac{\sqrt{(7+3)-2\sqrt{7 \cdot 3}}}{\sqrt{2}} = \frac{\sqrt{7}-\sqrt{3}}{\sqrt{2}} = \frac{\sqrt{14}-\sqrt{6}}{2}$

15 次の式を簡単にせよ。

(1) $\sqrt{7+2\sqrt{12}}$ (2) $\sqrt{11-\sqrt{72}}$ (3) $\sqrt{2-\sqrt{3}}$

解答 (1) $2 + \sqrt{3}$ (2) $3 - \sqrt{2}$ (3) $\frac{\sqrt{6}-\sqrt{2}}{2}$

解説

(1) $\sqrt{7+2\sqrt{12}} = \sqrt{(4+3)+2\sqrt{4 \cdot 3}} = \sqrt{4} + \sqrt{3} = 2 + \sqrt{3}$

(2) $\sqrt{11-\sqrt{72}} = \sqrt{11-2\sqrt{18}} = \sqrt{(9+2)-2\sqrt{9 \cdot 2}} = \sqrt{9} - \sqrt{2} = 3 - \sqrt{2}$

(3) $\sqrt{2-\sqrt{3}} = \sqrt{\frac{4-2\sqrt{3}}{2}} = \frac{\sqrt{4-2\sqrt{3}}}{\sqrt{2}} = \frac{\sqrt{(3+1)-2\sqrt{3 \cdot 1}}}{\sqrt{2}} = \frac{\sqrt{3}-\sqrt{1}}{\sqrt{2}} = \frac{\sqrt{3}-1}{\sqrt{2}} = \frac{\sqrt{6}-\sqrt{2}}{2}$

16 次の式を簡単にせよ。

(1) $\sqrt{5+2\sqrt{6}}$ (2) $\sqrt{10-2\sqrt{21}}$ (3) $\sqrt{12-\sqrt{140}}$

解答 (1) $\sqrt{3} + \sqrt{2}$ (2) $\sqrt{7} - \sqrt{3}$ (3) $\sqrt{7} - \sqrt{5}$

解説

(1) $\sqrt{5+2\sqrt{6}} = \sqrt{(3+2)+2\sqrt{3 \cdot 2}} = \sqrt{3} + \sqrt{2}$

(2) $\sqrt{10-2\sqrt{21}} = \sqrt{(7+3)-2\sqrt{7 \cdot 3}} = \sqrt{7} - \sqrt{3}$

(3) $\sqrt{12-\sqrt{140}} = \sqrt{12-2\sqrt{35}} = \sqrt{(7+5)-2\sqrt{7 \cdot 5}} = \sqrt{7} - \sqrt{5}$

17 次の式を簡単にせよ。

(1) $\sqrt{4+2\sqrt{3}}$ (2) $\sqrt{9-2\sqrt{14}}$ (3) $\sqrt{12+4\sqrt{5}}$
(4) $\sqrt{12-6\sqrt{3}}$ (5) $\sqrt{9+\sqrt{80}}$ (6) $\sqrt{11-\sqrt{96}}$

解答 (1) $\sqrt{3} + 1$ (2) $\sqrt{7} - \sqrt{2}$ (3) $\sqrt{10} + \sqrt{2}$ (4) $3 - \sqrt{3}$
(5) $\sqrt{5} + 2$ (6) $2\sqrt{2} - \sqrt{3}$

解説

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

(2) $\sqrt{9-2\sqrt{14}} = \sqrt{(7+2)-2\sqrt{7 \cdot 2}} = \sqrt{7} - \sqrt{2}$

(3) $\sqrt{12+4\sqrt{5}} = \sqrt{12+2\sqrt{2^2 \cdot 5}} = \sqrt{12+2\sqrt{20}} = \sqrt{(10+2)+2\sqrt{10 \cdot 2}} = \sqrt{10} + \sqrt{2}$

(4) $\sqrt{12-6\sqrt{3}} = \sqrt{12-2\sqrt{3^2 \cdot 3}} = \sqrt{12-2\sqrt{27}} = \sqrt{(9+3)-2\sqrt{9 \cdot 3}} = \sqrt{9} - \sqrt{3} = 3 - \sqrt{3}$

(5) $\sqrt{9+\sqrt{80}} = \sqrt{9+2\sqrt{20}} = \sqrt{(5+4)+2\sqrt{5 \cdot 4}} = \sqrt{5} + \sqrt{4} = \sqrt{5} + 2$

(6) $\sqrt{11-\sqrt{96}} = \sqrt{11-2\sqrt{24}} = \sqrt{(8+3)-2\sqrt{8 \cdot 3}} = \sqrt{8} - \sqrt{3} = 2\sqrt{2} - \sqrt{3}$