

11. 二重根号

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

次の式を簡単にせよ。

$$\begin{aligned}(1) \sqrt{4+2\sqrt{3}} &= \sqrt{(3+1)+2\sqrt{3}\times 1} \\ &= \sqrt{(\sqrt{3}+1)^2} \\ &= \sqrt{3}+1\end{aligned}$$

$$\begin{aligned}(2) \sqrt{19-2\sqrt{48}} &= \sqrt{(16+3)-2\sqrt{16}\times 3} \\ &= \sqrt{(\sqrt{16}-\sqrt{3})^2} \\ &= 4-\sqrt{3}\end{aligned}$$

$$\begin{aligned}(3) \sqrt{5+\sqrt{24}} &= \sqrt{5+2\sqrt{6}} \\ &= \sqrt{(3+2)+2\sqrt{3}\times 2} \\ &= \sqrt{(\sqrt{3}+\sqrt{2})^2} \\ &= \sqrt{3}+\sqrt{2}\end{aligned}$$

$$\begin{aligned}(4) \sqrt{11+4\sqrt{6}} &= \sqrt{11+2\sqrt{24}} \\ &= \sqrt{(8+3)+2\sqrt{8}\times 3} \\ &= \sqrt{(\sqrt{8}+\sqrt{3})^2} \\ &= 2\sqrt{2}+\sqrt{3}\end{aligned}$$

$$\begin{aligned}(5) \quad \sqrt{12-8\sqrt{2}} &= \sqrt{12-2\sqrt{32}} \\ &= \sqrt{8+4-2\sqrt{8\times 4}} \\ &= \sqrt{(\sqrt{8}-\sqrt{4})^2} \\ &= 2\sqrt{2}-2\end{aligned}$$

$$\begin{aligned}(6) \quad \sqrt{5-\sqrt{21}} &= \sqrt{\frac{10-2\sqrt{21}}{2}} \\ &= \frac{1}{\sqrt{2}}\sqrt{(7+3)-2\sqrt{7\times 3}} \\ &= \frac{1}{\sqrt{2}}\sqrt{(\sqrt{7}-\sqrt{3})^2} \\ &= \frac{\sqrt{7}-\sqrt{3}}{\sqrt{2}} \\ &= \frac{\sqrt{14}-\sqrt{6}}{2}\end{aligned}$$