

[練習 30]

(1)  $\pm\sqrt{6}$

(2)  $\sqrt{16} = \sqrt{4^2} = 4, \quad -\sqrt{\frac{9}{25}} = -\sqrt{\left(\frac{3}{5}\right)^2} = -\frac{3}{5}$

[練習 31]

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

(2)  $\sqrt{2}\sqrt{8} = \sqrt{2 \cdot 8} = \sqrt{16} = 4$

(3)  $\frac{\sqrt{6}}{\sqrt{3}} = \sqrt{\frac{6}{3}} = \sqrt{2}$

(4)  $\frac{\sqrt{24}}{\sqrt{2}} = \sqrt{\frac{24}{2}} = \sqrt{12} = \sqrt{2^2 \cdot 3} = 2\sqrt{3}$

[練習 32]

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

(2)  $\sqrt{2} + \sqrt{32} - \sqrt{72} = \sqrt{2} + 4\sqrt{2} - 6\sqrt{2}$   
 $= (1 + 4 - 6)\sqrt{2}$   
 $= -\sqrt{2}$

[練習 33]

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

(2)  $(2\sqrt{3} - \sqrt{2})^2 = (2\sqrt{3})^2 - 2 \cdot 2\sqrt{3}\sqrt{2} + (\sqrt{2})^2$   
 $= 4 \cdot 3 - 4\sqrt{6} + 2$   
 $= 14 - 4\sqrt{6}$

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

(4)  $(3 - \sqrt{5})(3 + \sqrt{5}) = 3^2 - (\sqrt{5})^2 = 9 - 5 = 4$

[練習 34]

(1)  $\frac{2}{\sqrt{3}} = \frac{2 \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}} = \frac{2\sqrt{3}}{3}$

(2)  $\frac{4}{\sqrt{2}} = \frac{4 \times \sqrt{2}}{\sqrt{2} \times \sqrt{2}} = \frac{4\sqrt{2}}{2} = 2\sqrt{2}$

(3)  $\frac{\sqrt{3}}{\sqrt{2}} = \frac{\sqrt{3} \times \sqrt{2}}{\sqrt{2} \times \sqrt{2}} = \frac{\sqrt{6}}{2}$

(4)  $\frac{1}{2\sqrt{5}} = \frac{1 \times \sqrt{5}}{2\sqrt{5} \times \sqrt{5}} = \frac{\sqrt{5}}{10}$

[練習 35]

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

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

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

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

[練習 36]

$x = \frac{1}{\sqrt{7} - \sqrt{5}} = \frac{\sqrt{7} + \sqrt{5}}{(\sqrt{7} - \sqrt{5})(\sqrt{7} + \sqrt{5})} = \frac{\sqrt{7} + \sqrt{5}}{2}$

$y = \frac{1}{\sqrt{7} + \sqrt{5}} = \frac{\sqrt{7} - \sqrt{5}}{(\sqrt{7} + \sqrt{5})(\sqrt{7} - \sqrt{5})} = \frac{\sqrt{7} - \sqrt{5}}{2}$

(1)  $x + y = \frac{\sqrt{7} + \sqrt{5}}{2} + \frac{\sqrt{7} - \sqrt{5}}{2} = \sqrt{7}$

$xy = \frac{\sqrt{7} + \sqrt{5}}{2} \cdot \frac{\sqrt{7} - \sqrt{5}}{2} = \frac{2}{4} = \frac{1}{2}$

(2)  $x^2 + y^2 = (x + y)^2 - 2xy = (\sqrt{7})^2 - 2 \cdot \frac{1}{2} = 6$

**【参考】**  $x, y$ それぞれの分母を有理化せずに、直ちに  $x + y$ を計算してもよい。

本問では、分母が  $\sqrt{7} - \sqrt{5}, \sqrt{7} + \sqrt{5}$  であるから、通分と同時に分母が有理化されるからである。

[練習 37]

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

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

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

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

(2)  $x^2 + y^2 = (x + y)^2 - 2xy = (2\sqrt{2})^2 - 2 \cdot 1 = 6$

(3)  $x^2y + xy^2 = xy(x + y) = 1 \cdot 2\sqrt{2} = 2\sqrt{2}$

**【参考】**  $x, y$ それぞれの分母を有理化せずに、直ちに  $x + y$ を計算してもよい。

本問では、分母が  $\sqrt{2} + 1, \sqrt{2} - 1$  であるから、通分と同時に分母が有理化されるからである。