

練習 27

(1) ± 7 (2) $\sqrt{25} = 5$

練習 28

$(\sqrt{7})^2 = 7, \quad (-\sqrt{15})^2 = 15$

練習 29

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

(2) $3\sqrt{50} - 4\sqrt{18} + \sqrt{32} = 15\sqrt{2} - 12\sqrt{2} + 4\sqrt{2}$
 $= (15-12+4)\sqrt{2} = 7\sqrt{2}$

(3) $(\sqrt{7}+2)(\sqrt{7}-2) = (\sqrt{7})^2 - 2^2 = 7-4=3$

(4) $(4\sqrt{2}-3\sqrt{3})(5\sqrt{2}+2\sqrt{3})$
 $= 4\sqrt{2} \cdot 5\sqrt{2} + 4\sqrt{2} \cdot 2\sqrt{3} - 3\sqrt{3} \cdot 5\sqrt{2}$
 $- 3\sqrt{3} \cdot 2\sqrt{3}$
 $= 40 + 8\sqrt{6} - 15\sqrt{6} - 18$
 $= 22 - 7\sqrt{6}$

(5) $(\sqrt{3}+2\sqrt{6})^2 = (\sqrt{3})^2 + 2 \cdot \sqrt{3} \cdot 2\sqrt{6} + (2\sqrt{6})^2$
 $= 3 + 12\sqrt{2} + 24 = 27 + 12\sqrt{2}$

(6) $(3\sqrt{2}-2\sqrt{7})^2 = (3\sqrt{2})^2 - 2 \cdot 3\sqrt{2} \cdot 2\sqrt{7} + (2\sqrt{7})^2$
 $= 18 - 12\sqrt{14} + 28 = 46 - 12\sqrt{14}$

練習 30

(1) $\frac{18}{\sqrt{6}} = \frac{18 \times \sqrt{6}}{\sqrt{6} \times \sqrt{6}} = \frac{18\sqrt{6}}{6} = 3\sqrt{6}$

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

(3) $\frac{\sqrt{5}+\sqrt{2}}{\sqrt{5}-\sqrt{2}} = \frac{(\sqrt{5}+\sqrt{2})^2}{(\sqrt{5}-\sqrt{2})(\sqrt{5}+\sqrt{2})}$
 $= \frac{5+2\sqrt{10}+2}{(\sqrt{5})^2 - (\sqrt{2})^2} = \frac{7+2\sqrt{10}}{3}$

(4) $\frac{3\sqrt{7}-\sqrt{3}}{\sqrt{7}+\sqrt{3}} = \frac{(3\sqrt{7}-\sqrt{3})(\sqrt{7}-\sqrt{3})}{(\sqrt{7}+\sqrt{3})(\sqrt{7}-\sqrt{3})}$
 $= \frac{21-3\sqrt{21}-\sqrt{21}+3}{(\sqrt{7})^2 - (\sqrt{3})^2}$
 $= \frac{24-4\sqrt{21}}{4}$
 $= 6 - \sqrt{21}$

練習 31

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

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

よって $x+y = \frac{\sqrt{7}-\sqrt{5}}{2} + \frac{\sqrt{7}+\sqrt{5}}{2} = \sqrt{7}$

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

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

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

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

(p.31) 発展 練習 1

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

ゆえに

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

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

よって

$x^2+y^2 = (x+y)^2 - 3xy(x+y)$
 $= (\sqrt{5})^2 - 3 \cdot 1 \cdot \sqrt{5}$
 $= 2\sqrt{5}$