Basic

36.

(1) 与式 $= \dfrac{18x^2y^5z}{8x^3y^6z^3}$
$= \boldsymbol{\dfrac{9}{4xyz^2}}$

(2) 与式 $= \dfrac{xy^2(x+y)}{y(x^2-y^2)}$
$= \dfrac{xy^2(x+y)}{y(x+y)(x-y)}$
$= \boldsymbol{\dfrac{xy}{x-y}}$

(3) 与式 $= \dfrac{\{x+(y-1)\}\{x-(y-1)\}}{\{(x+y)+1)\}\{(x+y)-1\}}$
$= \dfrac{(x+y-1)(x-y+1)}{(x+y+1)(x+y-1)}$
$= \boldsymbol{\dfrac{x-y+1}{x+y+1}}$

(4) 与式 $= \dfrac{(x-2)(x-4)}{(x-2)(x^2+2x+4)}$
$= \boldsymbol{\dfrac{x-4}{x^2+2x+4}}$

37.

(1) 与式 $= \dfrac{2(x+3)}{(x+2)(x+3)} + \dfrac{x+2}{(x+2)(x+3)}$
$= \dfrac{2x+6+x+2}{(x+2)(x+3)}$
$= \boldsymbol{\dfrac{3x+8}{(x+2)(x+3)}}$

(2) 与式 $= \dfrac{x-y}{x+y} + \dfrac{2xy}{(x+y)(x-y)}$
$= \dfrac{(x-y)^2}{(x+y)(x-y)} + \dfrac{2xy}{(x+y)(x-y)}$
$= \dfrac{x^2-2xy+y^2+2xy}{(x+y)(x-y)}$
$= \boldsymbol{\dfrac{x^2+y^2}{(x+y)(x-y)}}$

(3) 与式 $= \dfrac{(a+b)^2}{(a+b)(a-b)} + \dfrac{(a-b)^2}{(a+b)(a-b)}$
$= \dfrac{a^2+2ab+b^2-(a^2-2ab+b^2)}{(a+b)(a-b)}$
$= \boldsymbol{\dfrac{4ab}{(a+b)(a-b)}}$

(4) 与式 $= \dfrac{1}{2a-1} + \dfrac{1}{2a+1} - \dfrac{2}{(2a+1)(2a-1)}$
$= \dfrac{2a+1}{(2a+1)(2a-1)} + \dfrac{2a-1}{(2a+1)(2a-1)}$
$- \dfrac{2}{(2a+1)(2a-1)}$
$= \dfrac{2a+1+2a-1-2}{(2a+1)(2a-1)}$
$= \dfrac{4a-2}{(2a+1)(2a-1)}$
$= \dfrac{2(2a-1)}{(2a+1)(2a-1)}$
$= \boldsymbol{\dfrac{2}{(2a+1)}}$

38.

(1) 与式 $= \dfrac{-8x^3y^3 \cdot 6z^3}{9z^2 \cdot x^4y^2}$
$= \boldsymbol{-\dfrac{16yz}{3x}}$

(2) 与式 $= \dfrac{(a+b)(a+3b)}{(a+2b)(a^2-2ab+4b^2)} \cdot \dfrac{a+2b}{a(a+b)}$
$= \dfrac{(a+b)(a+3b)\cdot(a+2b)}{(a+2b)(a^2-2ab+4b^2)\cdot a(a+b)}$
$= \boldsymbol{\dfrac{a+3b}{a(a^2-2ab+4b^2)}}$

39.

$$
\begin{aligned}
(\ 1\ )\text{与式} &= \frac{(1-\frac{1}{a})\cdot a^2}{(a-\frac{1}{a^2})\cdot a^2} \\
&= \frac{a^2-a}{a^3-1} \\
&= \frac{a(a-1)}{(a-1)(a^2+a+1)} \\
&= \boldsymbol{\frac{a}{a^2+a+1}}
\end{aligned}
$$

$$
\begin{aligned}
(\ 2\ )\text{与式} &= \frac{(x+1-\frac{4}{x+1})\cdot(x+1)}{(1-\frac{2}{x+1})\cdot(x+1)} \\
&= \frac{(x+1)^2-4}{x+1-2} \\
&= \frac{\{(x+1)+2\}\{(x+1)-2\}}{x-1} \\
&= \frac{(x+3)(x-1)}{x-1} \\
&= \boldsymbol{x+3}
\end{aligned}
$$

40.

(1)

$$
\begin{array}{r|l}
x-2 & x^2-3x+3 \\
\cline{2-2}
 & x^2-2x \\
\cline{2-2}
 & -x+3 \\
 & -x+2 \\
\cline{2-2}
 & 1
\end{array}
$$

$$\text{与式} = \boldsymbol{x-1+\frac{1}{x-2}}$$

(2)

$$
\begin{array}{r|l}
x^2-2x+3 & x^3+3x^2-4x+7 \\
\cline{2-2}
 & x^3-2x^2+3x \\
\cline{2-2}
 & 5x^2-7x+7 \\
 & 5x^2-10x+15 \\
\cline{2-2}
 & 3x-8
\end{array}
$$

$$\text{与式} = \boldsymbol{x+5+\frac{3x-8}{x^2-2x+3}}$$

41.

$$
\begin{aligned}
(\ 1\ )|1-4|+|2-1| &= (4-1)+(2-1) \\
&= \boldsymbol{4}
\end{aligned}
$$

$$
\begin{aligned}
(\ 2\ )|7-4|+|2-7| &= (7-4)+(7-2) \\
&= \boldsymbol{8}
\end{aligned}
$$

$$
\begin{aligned}
(\ 3\ )|\pi-4|+|2-\pi| &= (4-\pi)+(\pi-2) \\
&= \boldsymbol{2}
\end{aligned}
$$

42.

$$
\begin{aligned}
(\ 1\ )\text{与式} &= 2\sqrt{2}-4\sqrt{2}+6\sqrt{2} \\
&= \boldsymbol{4\sqrt{2}}
\end{aligned}
$$

$$
\begin{aligned}
(\ 2\ )\text{与式} &= 2\sqrt{2}\cdot\sqrt{2}+2\sqrt{2}\cdot 4\sqrt{3} \\
&\quad -\sqrt{3}\cdot\sqrt{2}-\sqrt{3}\cdot 4\sqrt{3} \\
&= 4+8\sqrt{6}-\sqrt{6}-12 \\
&= \boldsymbol{-8+7\sqrt{6}}
\end{aligned}
$$

$$
\begin{aligned}
(\ 3\ )\text{与式} &= \frac{3\sqrt{3}}{12\sqrt{3}} \\
&= \boldsymbol{\frac{1}{4}}
\end{aligned}
$$

$$
\begin{aligned}
(\ 4\ )\text{与式} &= (\sqrt{2})^2+2\cdot\sqrt{2}\cdot\frac{1}{\sqrt{2}}+(\frac{1}{\sqrt{2}})^2 \\
&= 2+2+\frac{1}{2} \\
&= \boldsymbol{\frac{9}{2}}
\end{aligned}
$$

43.

$$
\begin{aligned}
(\ 1\ )\text{与式} &= |3-\sqrt{3}| \\
&= \boldsymbol{3-\sqrt{3}}
\end{aligned}
$$

$$
\begin{aligned}
(\ 2\ )\text{与式} &= |2-3\sqrt{2}| \\
&= \boldsymbol{3\sqrt{2}-2}
\end{aligned}
$$

44.

$$
\begin{aligned}
(\ 1\ )\text{与式} &= \frac{4\sqrt{3}\cdot\sqrt{2}}{\sqrt{2}\cdot\sqrt{2}} \\
&= \frac{4\sqrt{6}}{2} \\
&= \boldsymbol{2\sqrt{6}}
\end{aligned}
$$

(2) 与式 $= \dfrac{\sqrt{5}-\sqrt{3}}{(\sqrt{5}+\sqrt{3})(\sqrt{5}-\sqrt{3})}$
$= \dfrac{\sqrt{5}-\sqrt{3}}{5-3}$
$= \boldsymbol{\dfrac{\sqrt{5}-\sqrt{3}}{2}}$

(3) 与式 $= \dfrac{\sqrt{6}(\sqrt{3}+\sqrt{2})}{(\sqrt{3}-\sqrt{2})(\sqrt{3}+\sqrt{2})}$
$= \dfrac{3\sqrt{2}+2\sqrt{3}}{3-2}$
$= \boldsymbol{3\sqrt{2}+2\sqrt{3}}$

(4) 与式 $= \dfrac{(3-2\sqrt{2})(3-2\sqrt{2})}{(3+2\sqrt{2})(3-2\sqrt{2})}$
$= \dfrac{9-12\sqrt{2}+8}{9-8}$
$= \boldsymbol{17-12\sqrt{2}}$

45.

(1) 与式 $= 2+3-3i+4i$
$= \boldsymbol{5+i}$

(2) 与式 $= 4-2+i+7i$
$= \boldsymbol{2+8i}$

(3) 与式 $= 3-5i+9i-15i^2$
$= 3+4i+15$
$= \boldsymbol{18+4i}$

(4) 与式 $= 4+12i+9i^2$
$= 4+12i-9$
$= \boldsymbol{-5+12i}$

(5) 与式 $= \dfrac{(1-i)(1-i)}{(1+i)(1-i)}$
$= \dfrac{1-2i+i^2}{1-i^2}$
$= \dfrac{-2i}{2}$
$= \boldsymbol{-i}$

(6) 与式 $= \dfrac{(1-3i)+(1+3i)}{(1+3i)(1-3i)}$
$= \dfrac{2}{1-9i^2}$
$= \dfrac{2}{10}$
$= \boldsymbol{\dfrac{1}{5}}$

46.

(1) 与式 $= (\sqrt{3}i)^2$
$= 3i^2$
$= \boldsymbol{-3}$

(2) 与式 $= \sqrt{8}i \cdot \sqrt{2}i$
$= 4i^2$
$= \boldsymbol{-4}$

(3) 与式 $= 2\sqrt{2}i + \sqrt{2}i$
$= \boldsymbol{3\sqrt{2}i}$

(4) 与式 $= \sqrt{5}i \cdot \sqrt{5}$
$= \boldsymbol{5i}$

(5) 与式 $= \sqrt{2} \cdot \sqrt{3}i$
$= \boldsymbol{\sqrt{6}i}$

(6) 与式 $= \dfrac{\sqrt{12}i}{\sqrt{3}i}$
$= \sqrt{4}$
$= \boldsymbol{2}$

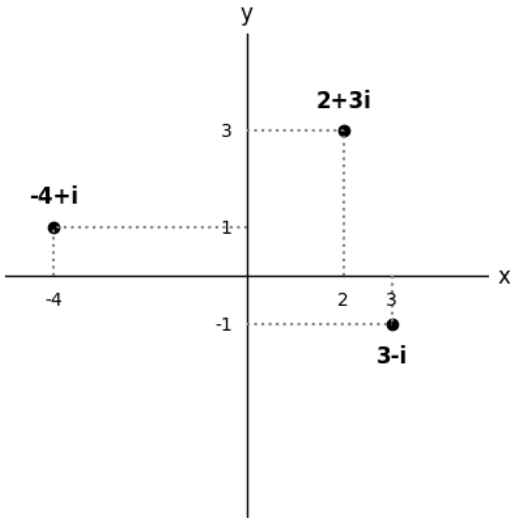
(7) 与式 $= \dfrac{\sqrt{8}}{\sqrt{2}i}$
$= -\sqrt{4}i$
$= \boldsymbol{-2i}$

(8) 与式 $= \dfrac{\sqrt{27}i}{\sqrt{3}}$
$= \sqrt{9}i$
$= \boldsymbol{3i}$

47.

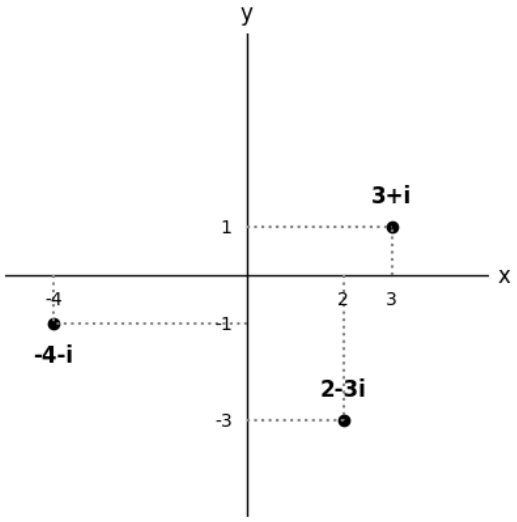
(1) $\mathbf{1+3i}$
(2) $\mathbf{3-2i}$
(3) $\mathbf{-3+i}$
(4) $\mathbf{-3i}$

48.



49.

(1) $\overline{2+3i} = \mathbf{2-3i}$
(2) $\overline{-4+i} = \mathbf{-4-i}$
(3) $\overline{3-i} = \mathbf{3+i}$



50.

(1) 与式 $= 4+3i+4-3i$
$= \mathbf{8}$

(2) 与式 $= (4+3i)(4-3i)$
$= 16-9i^2$
$= 16+9$
$= \mathbf{25}$

(3) 与式 $= 3-2i-(3+2i)$
$= 3-2i-3-2i$
$= \mathbf{-4i}$

(4) 与式 $= (3-2i)(3+2i)$
$= 9-4i^2$
$= 9+4$
$= \mathbf{13}$

51.

(1) 与式 $= |1+i|$
$= \sqrt{1^2+1^2}$
$= \mathbf{\sqrt{2}}$

(2) 与式 $= |1-i|$
$= \sqrt{1^2+(-1)^2}$
$= \mathbf{\sqrt{2}}$

(3) 与式 $= |-3i|$
$= \sqrt{0+(-3)^2}$
$= \mathbf{3}$

(4) 与式 $= |1+2i|$
$= \sqrt{1^2+2^2}$
$= \mathbf{\sqrt{5}}$

(5) 与式 $= |-3-4i|$
$= \sqrt{(-3)^2+(-4)^2}$
$= \mathbf{5}$

(6) 与式 $= |1+\sqrt{3}i|$
$= \sqrt{1^2+(\sqrt{3})^2}$
$= \mathbf{2}$

Check

52.

(1) 与式 $= \dfrac{6x^4y^6}{8x^3y^9}$

$= \boldsymbol{\dfrac{3x}{4y^3}}$

(2) 与式 $= \dfrac{a}{a+3b} + \dfrac{3ab}{(a+3b)(a-3b)}$

$= \dfrac{a(a-3b)+3ab}{(a+3b)(a-3b)}$

$= \dfrac{a^2-3ab+3ab}{(a+3b)(a-3b)}$

$= \boldsymbol{\dfrac{a^2}{(a+3b)(a-3b)}}$

(3) 与式 $= -\dfrac{y}{x} \cdot \dfrac{y^3}{x^2} \cdot (-\dfrac{x^3}{y^2})$

$= \dfrac{x^3y^4}{x^3y^2}$

$= \boldsymbol{y^2}$

(4) 与式 $= \dfrac{(x-1)^2}{x(x-2)} \cdot \dfrac{x-2}{(x+1)(x+2)} \cdot \dfrac{x(x+1)}{x-1}$

$= \boldsymbol{\dfrac{x-1}{x+2}}$

(5) 与式 $= \dfrac{x^2-2x}{x^2+3x-10}$

$= \dfrac{x(x-2)}{(x-2)(x+5)}$

$= \boldsymbol{\dfrac{x}{x+5}}$

(6) 与式 $= \dfrac{x(x+2)+2-x^2}{x+2-x}$

$= \dfrac{2x+2}{2}$

$= \boldsymbol{x+1}$

53.

(1)

$$
\begin{array}{r}
x+1 \\
x^2-4x+3 \overline{)\ x^3-3x^2-\ \ x+6} \\
\underline{x^3-4x^2+3x\ \ \ \ } \\
x^2-4x+6 \\
\underline{x^2-4x+3\ \ \ \ } \\
3
\end{array}
$$

与式 $= \boldsymbol{x+1+\dfrac{3}{x^2-4x+3}}$

(2)

$$
\begin{array}{r}
x-\ \ 2 \\
x^2-3x+2 \overline{)\ x^3-\ \ 5x^2+9x+2} \\
\underline{x^3-\ \ 3x^2+2x\ \ \ \ } \\
-2x^2+7x+2 \\
\underline{-2x^2+6x-4\ \ \ \ } \\
x+6
\end{array}
$$

与式 $= \boldsymbol{x-2+\dfrac{x+6}{x^2-3x+2}}$

54.

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

$= \boldsymbol{5\sqrt{2}}$

(2) 与式 $= \sqrt{20}-\sqrt{10}+\sqrt{10}-\sqrt{5}$

$= 2\sqrt{5}-\sqrt{5}$

$= \boldsymbol{\sqrt{5}}$

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

$= \dfrac{2\sqrt{3}}{3\sqrt{3}-3+3-\sqrt{3}}$

$= \dfrac{2\sqrt{3}}{2\sqrt{3}}$

$= \boldsymbol{1}$

(4) $X = 2+\sqrt{3}$ として

与式 $= (X+\sqrt{7})(X-\sqrt{7})$

$= X^2-7$

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

$= 4+4\sqrt{3}+3-7$

$= \boldsymbol{4\sqrt{3}}$

55.

(1) 与式 $= |1-\sqrt{2}|$
$= \boldsymbol{\sqrt{2}-1}$

(2) 与式 $= \dfrac{\sqrt{3}+1}{(\sqrt{3}-1)(\sqrt{3}+1)} + \dfrac{\sqrt{5}-\sqrt{3}}{(\sqrt{5}+\sqrt{3})(\sqrt{5}-\sqrt{3})}$
$= \dfrac{\sqrt{3}+1}{3-1} + \dfrac{\sqrt{5}-\sqrt{3}}{5-3}$
$= \dfrac{\sqrt{3}+1+\sqrt{5}-\sqrt{3}}{2}$
$= \boldsymbol{\dfrac{1+\sqrt{5}}{2}}$

56.

(1) 与式 $= |5-7|$
$= |7-5|$
$= \boldsymbol{2}$

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

(3) 与式 $= |6-2\sqrt{5}||6+2\sqrt{5}|$
$= 36-20$
$= \boldsymbol{16}$

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

57.

(1) 与式 $= 6-9i+4i-6i^2$
$= 6-5i+6$
$= \boldsymbol{12-5i}$

(2) 与式 $= -\dfrac{1}{2i}(1+2i+i^2)$
$= \dfrac{1}{2i}+1+\dfrac{1}{2}i$
$= -\dfrac{1}{2}i+1+\dfrac{1}{2}i$
$= \boldsymbol{1}$

(3) 与式 $= \sqrt{3}i \cdot 3\sqrt{3}i$
$= 9i^2$
$= \boldsymbol{-9}$

(4) 与式 $= \dfrac{4\sqrt{2}}{\sqrt{2}i}$
$= \boldsymbol{-4i}$

58.

(1) 与式 $= |3-2i|$
$= \sqrt{3^2+(-2)^2}$
$= \boldsymbol{\sqrt{13}}$

(2) 与式 $= |(2-i)(1-2i)|$
$= |2-4i-i+2i^2|$
$= |2-5i-2|$
$= |-5i|$
$= \sqrt{0^2+(-5)^2}$
$= \boldsymbol{5}$

(3) 与式 $= \left|\dfrac{2-i}{2+i}\right|$
$= \dfrac{\sqrt{2^2+(-1)^2}}{\sqrt{2^2+1^2}}$
$= \dfrac{\sqrt{5}}{\sqrt{5}}$
$= \boldsymbol{1}$

(4) 与式 $= \left|\dfrac{3-4i}{1+2i}\right|$
$= \dfrac{\sqrt{3^2+(-4)^2}}{\sqrt{1^2+2^2}}$
$= \dfrac{5}{\sqrt{5}}$
$= \boldsymbol{\sqrt{5}}$

59.

(1) 与式 $= 2+3i+\overline{2+3i}$
$= 2+3i+2-3i$
$= \boldsymbol{4}$

(2) 与式 $= (2+3i)^2$
$= 4+12i+9i^2$
$= 4+12i-9$
$= \boldsymbol{-5+12i}$

(3) 与式 $= |2+3i|^2$
$= (\sqrt{2^2+3^2})^2$
$= \mathbf{13}$

(4) 与式 $= (2+3i)(\overline{2+3i})$
$= (2+3i)(2-3i)$
$= 4-9i^2$
$= 4+9$
$= \mathbf{13}$

Step up

60.

(1) 与式 $= \dfrac{3}{(x-2)(x-3)} - \dfrac{2}{(x-3)(x-1)} - \dfrac{1}{(x-2)(x-1)}$
$= \dfrac{3(x-1)-2(x-2)-(x-3)}{(x-1)(x-2)(x-3)}$
$= \dfrac{3x-2x-x-3+4+3}{(x-1)(x-2)(x-3)}$
$= \dfrac{\mathbf{4}}{\boldsymbol{(x-1)(x-2)(x-3)}}$

(2) 与式

$= \dfrac{-(b+c)}{(a-b)(c-a)} + \dfrac{-(c+a)}{(b-c)(a-b)} + \dfrac{-(a+b)}{(c-a)(b-c)}$
$= \dfrac{-(b+c)(b-c)-(c+a)(c-a)-(a+b)(a-b)}{(a-b)(b-c)(c-a)}$
$= \dfrac{-(b^2-c^2)-(c^2-a^2)-(a^2-b^2)}{(a-b)(b-c)(c-a)}$
$= \dfrac{-b^2+c^2-c^2+a^2-a^2+b^2}{(a-b)(b-c)(c-a)}$
$= \mathbf{0}$

(3) 与式 $= \dfrac{(x-y)^2}{(x-y)(x^2+xy+y^2)} \cdot (-\dfrac{x-y}{xy(x+y)})$
$= -\dfrac{\boldsymbol{x+y}}{\boldsymbol{xy(x^2+xy+y^2)}}$

(4) 与式 $= \dfrac{(2x+3y)(x+y)}{(x-y)^2} \cdot \dfrac{(x+y)(x-y)}{(2x-y)(x+y)}$
$\cdot \dfrac{(2x-y)(x-y)}{(2x-3y)(x+y)}$
$= \dfrac{\boldsymbol{2x+3y}}{\boldsymbol{2x-3y}}$

61.

(1) 与式 $= \dfrac{(x+1)(x+1)-(x-1)(x-1)}{(x+1)(x+1)+(x-1)(x-1)}$
$= \dfrac{(x+1)^2-(x-1)^2}{(x+1)^2+(x-1)^2}$
$= \dfrac{(x^2+2x+1)-(x^2-2x+1)}{(x^2+2x+1)+(x^2-2x+1)}$
$= \dfrac{4x}{2x^2+2}$
$= \dfrac{\boldsymbol{2x}}{\boldsymbol{x^2+1}}$

(2) 与式 $= \dfrac{2(t+2)+(t+2)(t-2)}{2(t+2)-(t+2)(t-2)}$
$= \dfrac{2t+4+t^2-4}{2t+4-(t^2-4)}$
$= \dfrac{2t+t^2}{2t-t^2}$
$= \dfrac{t(2+t)}{t(2-t)}$
$= -\dfrac{\boldsymbol{t+2}}{\boldsymbol{t-2}}$

(3) 与式 $= \dfrac{a-\dfrac{a}{a+1}}{a+\dfrac{a}{a-1}}$
$= \dfrac{a(a+1)(a-1)-a(a-1)}{a(a+1)(a-1)+a(a+1)}$
$= \dfrac{(a-1)\{a(a+1)-a\}}{(a+1)\{a(a-1)+a\}}$
$= \dfrac{a^2(a-1)}{a^2(a+1)}$
$= \dfrac{\boldsymbol{a-1}}{\boldsymbol{a+1}}$

(4) 与式 $= \dfrac{1}{1-\dfrac{1}{1-\dfrac{x}{x-1}}}$

$= \dfrac{1}{1-\dfrac{x-1}{x-1-x}}$

$= \dfrac{1}{1-\dfrac{x-1}{-1}}$

$= \dfrac{1}{1+x-1}$

$= \boldsymbol{\dfrac{1}{x}}$

62.

(1) 与式 $= \dfrac{2+\sqrt{3}-\sqrt{7}}{(2+\sqrt{3}+\sqrt{7})(2+\sqrt{3}-\sqrt{7})}$

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

$= \dfrac{2+\sqrt{3}-\sqrt{7}}{4+4\sqrt{3}+3-7}$

$= \dfrac{2+\sqrt{3}-\sqrt{7}}{4\sqrt{3}}$

$= \boldsymbol{\dfrac{2\sqrt{3}+3-\sqrt{21}}{12}}$

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

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

$= \dfrac{2+2\sqrt{2}}{1+2\sqrt{2}+2-3}$

$= \dfrac{2(1+\sqrt{2})}{2\sqrt{2}}$

$= \dfrac{1+\sqrt{2}}{\sqrt{2}}$

$= \boldsymbol{\dfrac{2+\sqrt{2}}{2}}$

63.

(1) $\alpha = a+bi, \beta = c+di$ と置く

$|\alpha| = |a+bi|$

$= \boldsymbol{\sqrt{a^2+b^2}}$

$|\overline{\alpha}| = |\overline{a-bi}|$

$= \sqrt{a^2+(-b)^2}$

$= \boldsymbol{\sqrt{a^2+b^2}}$

(2)

$|\alpha+\beta|^2 = (\alpha+\beta)(\overline{\alpha+\beta})$

$= (\alpha+\beta)(\overline{\alpha}+\overline{\beta})$

$= \alpha\overline{\alpha}+\alpha\overline{\beta}+\overline{\alpha}\beta+\beta\overline{\beta}$

$= \boldsymbol{|\alpha|^2+\alpha\overline{\beta}+\overline{\alpha}\beta+|\beta|^2}$

(3)

$|\alpha| = |\beta \cdot \dfrac{\alpha}{\beta}|$

$= |\beta||\dfrac{\alpha}{\beta}|$

$\dfrac{|\alpha|}{|\beta|} = \dfrac{1}{|\beta|} \cdot |\beta||\dfrac{\alpha}{\beta}|$

$= |\boldsymbol{\dfrac{\alpha}{\beta}}|$

64.

左辺 $= \sqrt{(\sqrt{a}+\sqrt{b})^2}$

$= \sqrt{a}+\sqrt{b} =$ 右辺

65.

(1) 与式 $= \sqrt{1+2\sqrt{2}+2}$

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

$= \boldsymbol{\sqrt{2}+1}$

(2) 与式 $= \sqrt{3+2-2\sqrt{6}}$

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

$= \boldsymbol{\sqrt{3}-\sqrt{2}}$

(3) 与式 $= \sqrt{4+2-2\sqrt{8}}$

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

$= \boldsymbol{2-\sqrt{2}}$

(4) 与式 $= \sqrt{4+3-2\sqrt{12}}$
$= \sqrt{(\sqrt{4}-\sqrt{3})^2}$
$= \boldsymbol{2-\sqrt{3}}$

(5) 与式 $= \sqrt{\dfrac{1}{2}+\dfrac{3}{2}+2\sqrt{\dfrac{3}{2}}}$
$= \sqrt{(\sqrt{\dfrac{1}{2}}+\sqrt{\dfrac{3}{2}})^2}$
$= \dfrac{1}{\sqrt{2}}+\dfrac{\sqrt{3}}{\sqrt{2}}$
$= \boldsymbol{\dfrac{\sqrt{6}+\sqrt{2}}{2}}$

(6) 与式 $= \sqrt{\dfrac{7}{2}+\dfrac{1}{2}-2\sqrt{\dfrac{7}{2}}}$
$= \sqrt{(\sqrt{\dfrac{7}{2}}-\sqrt{\dfrac{1}{2}})^2}$
$= \dfrac{\sqrt{7}}{\sqrt{2}}-\dfrac{1}{\sqrt{2}}$
$= \boldsymbol{\dfrac{\sqrt{14}-\sqrt{2}}{2}}$

66.

(1) 与式 $= \sqrt{(\sqrt{x}-1)^2}$
$= \boldsymbol{\sqrt{x}-1}$

(2) 与式 $= \sqrt{(\sqrt{a}+\sqrt{1-a})^2}$
$= \boldsymbol{\sqrt{a}+\sqrt{1-a}}$

67.

与式 $= \dfrac{5}{\sqrt{(\sqrt{6}-1)^2}}$
$= \dfrac{5}{\sqrt{6}-1}$
$= \dfrac{5(\sqrt{6}+1)}{(\sqrt{6}-1)(\sqrt{6}+1)}$
$= \dfrac{5\sqrt{6}+1}{6-1}$
$= \sqrt{6}+1$

$2<\sqrt{6}<3$ より,$3<\sqrt{6}+1<4$
よって $a=3, b=\sqrt{6}+1-3=\sqrt{6}-2$

$\dfrac{1}{a}+\dfrac{1}{b} = \dfrac{1}{3}+\dfrac{1}{\sqrt{6}-2}$
$= \dfrac{\sqrt{6}-2+3}{3\sqrt{6}-6}$
$= \dfrac{\sqrt{6}+1}{3\sqrt{6}-6}$
$= \dfrac{(\sqrt{6}+1)(3\sqrt{6}+6)}{(3\sqrt{6}-6)(3\sqrt{6}+6)}$
$= \dfrac{18+9\sqrt{6}+6}{54-36}$
$= \dfrac{24+9\sqrt{6}}{18}$
$= \boldsymbol{\dfrac{8+3\sqrt{6}}{6}}$