

v

3, 2, 1

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$$f(x) = \sqrt{(x-1)^2 + 1} = |\sqrt{x-1} + 1| \xrightarrow{x \geq 1} \sqrt{x-1} + 1, 0 \quad (1)$$

$$c = -1 \quad b = 1 \quad a = 1$$

$$\frac{a+b}{c} = \frac{1+1}{-1} = -\frac{2}{1}$$

$$\frac{x+1}{(x-1)(x-3)} \rightarrow x \neq 1, 3$$

$$f(x) = \frac{x+1}{x^2-4x+3} = \frac{x}{-1} = -x \quad (2)$$

$$\frac{g(x)}{f(x)} = \frac{1}{-x} = -\frac{1}{x}$$

$$f(0) = \frac{0+1}{0-0+3} = \frac{1}{3}$$

$$\frac{g(x)}{f(x)} = \frac{x}{\frac{1}{x}} = x \times x = x^2 = 4$$

$$\text{الف) } \left\{ \left(\frac{1}{x}, 1 \right), \left(\frac{x}{1}, -1 \right), (1, 1), \left(-\frac{1}{x}, 4 \right) \right\} \quad 1x = 1, 3, 4, -1 \quad (3)$$

$$\text{ب) } \left\{ (1, 1), (-1, 1), (\sqrt{3}, -1), (-\sqrt{3}, -1), (1, 1), (-1, 1) \right\} \quad x^2 = 1, 3, 4$$

$$\begin{aligned} \text{ج) } g(-1) &= 3 \rightarrow 1(x^2) + 1 = 19 \\ g(1) &= -1 \rightarrow 1(-1)^2 + 1 = 2 \\ g(3) &= 1 \rightarrow 1(3^2) + 1 = 10 \\ g(-1) &= 0 \rightarrow 1(0^2) + 1 = 1 \end{aligned} \quad \left\{ (-1, 19), (1, 2), (3, 10), (-1, 1) \right\}$$

$$\text{د) } \frac{xf(1)}{g(1)} = \frac{x}{-1} = -x \quad \frac{xf(3)}{g(3)} = \frac{-x}{1} = -x \quad \frac{xf(-1)}{g(-1)} = \frac{1x}{0} = x$$

$$\left\{ (1, -x), (3, -1) \right\}$$

$$\begin{aligned} h &= xf + g \\ f: x &\rightarrow 1 \quad x &\rightarrow 1 \quad -x &\rightarrow 0 \\ g: x &\rightarrow 1 \quad x &\rightarrow 3 \quad -x &\rightarrow 4 \end{aligned} \quad \left\{ (1, 0), (3, 0), (-1, 4) \right\} \quad (4)$$

$$g(x) + 1 \neq 0 \quad [x] + [-x] = 0 \quad x \in \mathbb{Z} \quad \checkmark \quad (5)$$

$$x \neq 0$$

$$\sqrt{3}x - x \neq 0$$

$$\sqrt{3}x \neq x$$

$$3x \neq x^2$$

$$x(3-x) \neq 0 \rightarrow 0 \leq x \leq 3, x \neq 1$$

$$[x] + [-x] = -1 \quad x \notin \mathbb{Z}$$

$$[0, 3] \rightarrow \text{المجموعة}$$

$$\hookrightarrow 0, 1, 2, 3 \quad \hookrightarrow \mathbb{Z}$$

$$D_f = \{ \dots, 1, 3 \}$$

$$f(1) = \sqrt{1-1-1} = 0$$

$$h(1) = 0$$

$$f(r) = \sqrt{1-r-1} = \sqrt{-r}$$

$$h(r) = \frac{\sqrt{r}}{r}$$

$$f(e) = \sqrt{1-1-1} = 0$$

$$h(e) = 0$$

$$f(\omega) = \sqrt{1-\omega-1} = \sqrt{-\omega}$$

$$\{(1,0), (r, \frac{\sqrt{r}}{r}), (e,0)\}$$

$$a) x^3 - 3x^2 + 3x$$

$$y = (x-1)^3 + 1$$

$$y-1 = (x-1)^3$$

$$\sqrt[3]{y-1} = x-1$$

$$x = \sqrt[3]{y-1} + 1$$

$$R_y = \mathbb{R}$$

$$b) yx^2 - 2xy = 1$$

(v)

$$yx^2 - 2xy - 1 = 0$$

$$\Delta = (-2y)^2 - 4(-1)(y) \geq 0$$

$$4y^2 + 4y \geq 0 \quad y^2 + y \geq 0 \quad y(y+1) \geq 0$$

$$y(y+1) \geq 0 \quad \frac{-1 \pm \sqrt{1+4}}{2} \quad R_y = (-\infty, -1] \cup [0, +\infty)$$

الف)

$$x = \frac{9}{r} = 2$$

$$y(2) = 4 - 4 + 1 = 1$$

$$\oplus x^2 \rightarrow R_y = [1, +\infty)$$

(A)

ب)

$$x = \frac{-4}{-r} = +3$$

$$y(+3) = -9 + 18 + 3 = -12$$

$$\ominus x^2 \rightarrow (-\infty, -12]$$

ج)

$$x = \frac{r}{r} = 1$$

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

د)

$$x = \frac{-4}{-r} = 3$$

$$y(3) = \sqrt{18-9} = \sqrt{9} = 3$$

$$\ominus x^2 \rightarrow (-\infty, 3] \rightarrow \sqrt{(-\infty, 3]} = [0, \sqrt{3}]$$

الف)

$$\mathbb{R}$$

$$b) \mathbb{R}$$

(A)

ج)

$$[0, \infty)$$

$$d) \frac{y}{x} \sim \frac{y}{x} \text{ (مقل 2) } \rightarrow y$$

$$R_y = [1, +\infty)$$

الف)

$$\frac{r(x+1)}{1-x-1}$$

$$R_y = \mathbb{R} - \{1\}$$

ب)

$$\frac{r(x+1)}{1-x+1}$$

$$R_y = \mathbb{R} - \{1\}$$

(A)