

$$\sqrt{x-4} = t \quad x = t^2 + 4$$

$$f(x) = \sqrt{t^2 + 4 + 4t} = \sqrt{(t+2)^2} \rightarrow f(x) = t+2$$

$$g(x) = \sqrt{t^2 + 4 - 4t} = \sqrt{(t-2)^2} = |t-2|$$

$$t = \sqrt{x-4} \geq \sqrt{4} = 2$$

$$|t-2| = t-2 \quad g(x) = t-2$$

$$f(x) + g(x) = 2t \rightarrow 2\sqrt{x-4} \quad a=0 \quad b=2 \quad c=-4$$

$$\frac{a+b}{c} = \frac{2}{-4} = -\frac{1}{2}$$

$$x=2 \rightarrow f(2) = \frac{2+2}{2-2+2} = \frac{4}{2} = 2 \rightarrow g(2) = -\frac{1}{2} \quad (2, -\frac{1}{2})$$

$$x=1 \rightarrow 1-4+2=0 \rightarrow f(1) = 0 \text{ و } g(1) = 0$$

$$f(3) = 0 \text{ و } g(3) = 0$$

$$x=0 \rightarrow f(0) = \frac{0}{0-0+0} = 0$$

$$g(0) = 2$$

$$\frac{g(0)}{f(0)} = \frac{2}{0} = \infty$$

$$\frac{g}{f} = \left\{ (2, -\frac{1}{2}), (0, 2) \right\}$$

$$f(x) = \left\{ \left(\frac{1}{2}, 2 \right), \left(\frac{1}{2}, -1 \right), (2, 2), \left(\frac{1}{2}, 4 \right) \right\}$$

$$f(x) = \left\{ (-1, 2), (1, 2), (2, 2), (-2, 2), (-\sqrt{3}, -1), (4\sqrt{3}, -1) \right\}$$

$$2 \times 9 + 1 = 19$$

$$2(1) + 1 = 3$$

$$2(4) + 1 = 9$$

$$2(0) + 1 = 1$$

$$x=1$$

$$x=3$$

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

$$\frac{f(3)}{g(3)} = \frac{0}{2} = 0$$

$$g(1) = 0$$

$$\left\{ (-2, 19), (1, 3), (4, 9), (-1, 1) \right\}$$

$$D_h = \{2, 3, -2\}$$

$$h = \{ (2, 0), (-2, 4), (3, 0) \}$$

$$h = 2f + g$$

$$h = 2 + 3 = 5 \rightarrow (2, 5)$$

$$h = 2 + 3 = 5 \rightarrow (2, 5)$$

$$h = 0 + 4 = 4 \rightarrow (-2, 4)$$

$$x \geq 0$$

$$\sqrt{x-4} \geq 0$$

$$\sqrt{x-4} \geq 0 \rightarrow x-4 \geq 0$$

$$x-4 \geq 0$$

$$x(x-4) \geq 0 \rightarrow x=0 \text{ or } x=4$$

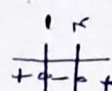
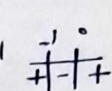
$$-1 \leq x \leq 4$$

$$g(x) = [x] + [-x] \quad x \in \mathbb{Z} \Rightarrow 0$$

$$x \notin \mathbb{Z} \Rightarrow -1$$

$$g(x) + 1 = \begin{cases} 0 & x \notin \mathbb{Z} \\ 1 & x \in \mathbb{Z} \end{cases}$$

$$\frac{D_f}{g+1} = \{0, 1, 2\}$$

$\alpha x = x^r - \varepsilon \geq 0$ $x^r - \alpha x + \varepsilon \leq 0$ $(x-1)(x-\varepsilon) \leq 0$ $1 < \alpha \leq \varepsilon$  $h(r) = \frac{\sqrt{r}}{r}$	$D_g = \{1, r, \varepsilon, 0\}$ $D_n = \{r, 1, \varepsilon\}$ $h \rightarrow \alpha = 1 \rightarrow \left. \begin{matrix} f(1) = 0 \\ g(1) = r \end{matrix} \right\} \Rightarrow \frac{0}{r} = 0$ $h(r) = 0$ $h = \{(1, 0), (r, \frac{\sqrt{r}}{r}), (\varepsilon, 0)\}$	6	
$y = x^r - rx + 1$ (الف) $y = (\alpha - 1)^r + 1$ $y - 1 = (\alpha - 1)^r$ $\alpha - 1 = \sqrt[r]{y - 1}$ $R = \mathbb{R}$	$y = \frac{1}{\alpha^r - rx}$ $\alpha^r - r\alpha y = 1$ $y(\alpha^r - r\alpha) = 1$ $\frac{\alpha^r - r\alpha}{y} = \frac{1}{y}$ $(\alpha - 1)^r - 1 = \frac{1}{y} \rightarrow (\alpha - 1)^r = \frac{1}{y} + 1$ $\frac{1}{y} + 1 \geq 0$ $\frac{y+1}{y} \geq 0$ $y = -1$ $y = 0$  $R = (-\infty, -1] \cup [0, +\infty)$	7	
$y = x^r - rx + 10$ $a = 1, b = -\varepsilon$ $\alpha = \frac{-(b-\varepsilon)}{r(1)} = r$ $r - 1 - r = \sqrt{r} \Rightarrow 0, +\infty$ $R = (0, +\infty)$	$y = -x^r + 4x + r$ (ب) $a = -1, b = r$ $\alpha = \frac{-y}{r(-1)} = r$ $y = (-r)^r + 1r + r \geq 1r$ $R = (-\infty, 1r]$ $R = [0, \frac{a}{r}]$	$a = 1, b = r$ $\alpha = \frac{r}{r} = 1$ $y = 1 - r + 10 = 9$ $R = [9, +\infty)$ $y_{\max} = \sqrt{\frac{r\omega}{r}} = \frac{\omega}{r}$ $\alpha x - \alpha^r$ $a = -1, b = 0$ $\alpha = \frac{-\omega}{r(-1)} = \frac{\omega}{r}$ $\frac{r\omega}{r} - \frac{r\omega}{r} = \frac{r\omega}{r}$	8
	$R = \mathbb{R} \leftarrow (الف)$ $R = \mathbb{R} \leftarrow (ب)$ $R = [0, +\infty) \leftarrow (ج)$ $R = [0, +\infty) \leftarrow (د)$	9	
$R = \mathbb{R} - \{r\}$ (الف) $R = \mathbb{R} - \{r\}$ (ب)		10	

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$$x=1 \rightarrow 1-4+2=0 \rightarrow f(1) = \text{undefined}$$

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$$\frac{f(1)}{g(1)} = \frac{2}{-1} = -2 \quad \frac{f(3)}{g(3)} = \frac{2}{-1} = -2$$

(د)

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$$-1+1=0 \quad 0 \leq x \leq 4$$

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

$$x \notin \mathbb{Z} = -1$$

$$g(x) + 1 = 0 \quad x \notin \mathbb{Z}$$

$$\frac{D_f}{g+1} = \{0, 1, 2\}$$