

$t = \sqrt{x-4}$ $f(x) = \sqrt{t^2 + 4t + 4} = t + 2$ $g(x) = \sqrt{t^2 - 4t + 4} = t - 2$ $f + g = 2t = 2\sqrt{x-4}$ $a=0 \quad b=2 \quad c=-4$ $\frac{a+b}{c} = \frac{-1}{2}$	۱
$f(x) = -x$ $\frac{g(x)}{f(x)} = \frac{1}{-x} = -\frac{1}{x}$ $f(0) = \frac{x}{y}$ $\frac{g(0)}{f(0)} = \frac{f}{\frac{x}{y}} = y$ $x=1, 3 \rightarrow f=0$ $\frac{g}{f} = \left\{ \left(1, -\frac{1}{x}\right), (0, y) \right\}$	۲
الف) $x_n = 1$ $x = \frac{1}{x}$ $x = x_n$ $\frac{x}{x} = 1$ $f(x) = \left\{ \left(\frac{1}{x}, x\right), \left(\frac{x}{x}, -1\right), (x, x), \left(-\frac{1}{x}, x\right) \right\}$ $f(x) = \left\{ (-1, x), (1, x), (-\sqrt{x}, -1), (\sqrt{x}, -1), (-x, x), (x, x) \right\}$ $x^2 = 1$ $x = \pm 1$ $x = 1 \rightarrow \frac{x}{-1} = -x$ $x = 3 \rightarrow \frac{x}{-1} = -1$ $x = -1 \rightarrow \frac{x}{0} = \infty$ $\frac{xf}{g} = \left\{ (1, -x), (x, -1) \right\}$ ب) $g(x) = \{(x, x), (1, x), (x, x), (-1, 1)\}$	۳
$x = 2, 3, -2$ $h(x) = x(1) + x = \omega$ $h(x) = x(1) + x = \omega$ $h(-2) = x(0) + y = 4$ $h = \{(x, \omega), (x, \omega), (-2, 4)\}$	۴
$\sqrt{x_n} - x \geq 0 \rightarrow 0 < x \leq x$ $x \neq x$ $\frac{x}{x+1}$ $g+1 \neq 0$ $g \neq -1$ $x \in \mathbb{Z} \checkmark$ $[0, 3] - \{2\}$ $= 0: \{0, 1, 3\}$ $g(x) = [x] + [-x] \rightarrow x \in \mathbb{Z} \quad g(x) = 0$ $\rightarrow x \notin \mathbb{Z} \quad g(x) = -1$	۵

$$f(x) = (1, 0), (2, \sqrt{2}), (4, 0), (9, 0)$$

$$h(x) = (1, 0), (2, \frac{\sqrt{2}}{2}), (4, 0)$$

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الف) $R = \mathbb{R}$

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ب) $y = \frac{1}{x^2 - 2x} \Rightarrow x^2 - 2x = (x-1)^2 - 1$

$\mathbb{R} = (-\infty, -1] \cup (0, +\infty)$

$y = \frac{1}{(x-1)^2 - 1} \rightarrow y((x-1)^2 - 1) = 1$

$y(x^2 - 2x - 1) = 1 \Rightarrow yx^2 - 2yx - y = 1$

$yx^2 - 2yx - y - 1 = 0 \Rightarrow (-y)x^2 - 2yx - (y+1) = 0$

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الف) $\lambda = \frac{6}{4} = 1.5$ $f = f(2) = -6 + 10 = 4$

$\mathbb{R} = [4, +\infty)$

ب) $\lambda = \frac{-9}{-3} = 3$ $-9 + 18 + 3 = 12$

$\mathbb{R} = (-\infty, 12]$

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ج) $\frac{+6}{4} = 1.5$ $f = 8 - 3 = 5$

$\mathbb{R} = [5, +\infty)$

د) $\lambda = \frac{-9}{-3} = 3$ $\mathbb{R} = [0, \sqrt{3}]$

الف) $R = \mathbb{R}$

ب) $R = \mathbb{R}$

ج) $R = [0, +\infty)$

د) $\mathbb{R} = [0, +\infty)$

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الف) $R = \mathbb{R} - \{3\}$

ب) $R = \mathbb{R} - \{2\}$

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