

پ. آفرین به سید

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$$(1) \quad \begin{aligned} f(x) &= \sqrt{x + \sqrt{x-2} + 2 - 2} = |\sqrt{x-2} + 2| = \sqrt{x-2} + 2 \\ g(x) &= \sqrt{x - 2\sqrt{x-2} + 2 - 2} = |\sqrt{x-2} - 2| = \sqrt{x-2} - 2 \end{aligned}$$

$$\frac{a+b}{c} = \frac{0+2}{-2} = -1 \quad \left\{ \begin{array}{l} a=0 \\ b=2 \\ c=-2 \end{array} \right.$$

$$(2) \quad \begin{aligned} g(x) &= \{(2,1), (1,0), (3,5), (0,2)\} \\ f(x) &= \frac{x+2}{x^2-2x+3} \end{aligned}$$

$$f(x) = \{(2, -1), (1, 2), (3, 4), (0, 2)\}$$

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

$$(3) \quad \begin{aligned} f(x) &\Rightarrow \{(\frac{1}{2}, 2), (2, -1), (2, 2), (-\frac{1}{2}, 4)\} \\ g(x) &\Rightarrow \{(\pm 1, 2), (\pm 2, -1), (\pm 2, 2)\} \end{aligned}$$

$$(4) \quad h = f + g \rightarrow h(x) = \{(2, 0), (2, 5), (-2, 4)\}$$

$$(5) \quad \begin{aligned} f(x) &= \sqrt{x^2 - x} \quad / \quad g(x) = [x] + [-x] \quad / \quad \left(\frac{f}{g}\right)(x) \rightarrow \frac{f(x)}{g(x)+1} \neq 0 \\ &\quad \frac{x-2 \neq 0}{x \neq 2} \quad \text{III} \end{aligned}$$

$$I \star \{x \in \mathbb{R} \mid x \geq 0\}$$

$$II \star \{x \in \mathbb{R} \mid x \leq 2\}$$

$$III \star \{x \in \mathbb{R} \mid x \geq 2\}$$

$$IV \star \{x \in \mathbb{R} \mid x \leq -2\}$$

$$V \star \{x \in \mathbb{R} \mid x \geq -2\}$$

٤) $f(n) = \sqrt{n^2 - n - 2} \mid g(n) = \{ (1,2), (2,2), (2,4), (0,1) \} \mid h(n) = \frac{f(n)}{g(n)} = ?$
 $\hookrightarrow n^2 - n - 2 \leq 0$
 $(n-1)(n-2) \leq 0 \Rightarrow \frac{1}{n-1} + \frac{2}{n-2} \geq 0$
 $\hookrightarrow (2) \Rightarrow \begin{cases} n=1 \rightarrow \frac{f(n)}{g(n)} = 0 \\ n=2 \rightarrow \frac{f(n)}{g(n)} = \frac{1}{2} \\ n=3 \rightarrow 0 \end{cases} \Rightarrow \{ (1,2), (2,2), (2,4) \}$

٥) الف) $y = x^2 - 2x + 1 \mid \rightarrow y = (x-1)^2 + 1 \mid \rightarrow y-1 = (x-1)^2 \mid \sqrt{y-1} = x-1$
 $\hookrightarrow x = \sqrt{y-1} + 1$
 $RP = \{ \mathbb{R} \}$

ب) $y = \frac{1}{x^2 - x} \mid \rightarrow yx^2 - xy - 1 = 0$
 $ax^2 + bx + c = 0$
 $\Delta = b^2 - 4ac \mid \rightarrow (-y)^2 - 4(-1)(-y) = y^2 - 4y \geq 0 \mid \rightarrow y(y-4) \geq 0$
 $\Rightarrow y \leq 0 \vee y \geq 4$
 $x = \frac{y \pm \sqrt{y^2 - 4y}}{2y} \mid y \neq 0 \mid y \neq 4$

١) الف) $y = x^2 - 2x + 1 \mid \rightarrow \begin{cases} n = \frac{-b}{2a} = 1 \\ y = 0 \end{cases} \mid \rightarrow 1 - 2 + 1 = 0$
 $\hookrightarrow RP = [4, +\infty)$

ب) $y = -x^2 + 4x + 3 \mid \rightarrow \begin{cases} n = \frac{-b}{2a} = 2 \\ y = 7 \end{cases} \mid \rightarrow RP = (-\infty, 7]$

٢) $y = \sqrt{x^2 - 2x - 3} \mid \rightarrow \begin{cases} n = \frac{-b}{2a} = 1 \\ y = 0 \end{cases} \mid \rightarrow \sqrt{-1, +\infty} = [0, +\infty) \mid RP$

٣) $y = \sqrt{4x - x^2} \mid \rightarrow \begin{cases} n = \frac{-b}{2a} = 2 \\ y = 2 \end{cases} \mid \rightarrow \sqrt{-2, 2} = [0, 2] \mid RP$

٤) الف) $y = \frac{1}{x^2 - 1} \mid \rightarrow \begin{cases} n = \frac{-b}{2a} = 0 \\ y = -1 \end{cases} \mid \rightarrow \sqrt{-1, +\infty} = (-\infty, -1] \mid RP$

١٠) الف) $y = \frac{x+1}{x^2 + 1} \mid \rightarrow \begin{cases} n = \frac{-b}{2a} = 0 \\ y = 1 \end{cases} \mid \rightarrow \sqrt{-1, +\infty} = (-\infty, 1] \mid RP$

ب) $y = \frac{x+1}{x+1} \mid \rightarrow 1 \neq 1 \mid \rightarrow RP = \mathbb{R} - \{1\}$