

سوال 11. $f(x) = \sqrt{x + \sqrt{x - 4}}$ $g(x) = \sqrt{x - \sqrt{x + 4}}$ $x \geq 1$

$\sqrt{12}\sqrt{4} = \sqrt{48} \therefore \sqrt{4}\sqrt{4} = \sqrt{16}$ $\sqrt{(\sqrt{x-4} + 2)^2} \xrightarrow{x \geq 1} \sqrt{x-4} + 2$

$\sqrt{x^2} = \sqrt{x^2 + 0} = \sqrt{x^2 + 0}$ $g(x) \rightarrow \sqrt{x - \sqrt{x-4}} \rightarrow \sqrt{(\sqrt{x-4} - 2)^2} \xrightarrow{x \geq 1} \sqrt{x-4} - 2$

$f(x) + g(x) = a + b\sqrt{x+c} \rightarrow 2\sqrt{x-4} \rightarrow \begin{cases} a = -4 \\ b = 2 \\ c = 0 \end{cases} \Rightarrow \frac{a+b}{c} = -\frac{1}{2}$

سوال 12. $f(x) = \frac{x^2 + 5}{x^2 - 4x + 5}$ $g(x) = \{(x, 1), (1, 2), (2, 5), (5, 1)\}$

$f(x) = \frac{x^2 + 5}{(x-2)(x-1)}$ $\frac{-x}{-1} + \frac{1}{-1} + \frac{5}{1} +$ $f(2) = \frac{4}{-1 \times 1} = -4$ $f(0) = \frac{5}{5} = 1$ $\frac{4}{5} = 4$

$\frac{g}{f} = \{(x, -\frac{1}{x}), (0, 4)\}$ $\frac{1}{-4}$

سوال 13. الف) $f(x) = \{(\frac{1}{x}, x), (\frac{x}{x}, -1), (x, x), (-\frac{1}{x}, 4)\}$

ب) $f(x) = \{(1, x), (-1, x), (\sqrt{x}, -1), (-\sqrt{x}, -1), (x, x), (-x, x)\}$

ج) $xg(x) + 1 = \{(x, 1), (1, x), (x, 4), (-1, 1)\}$

د) $\frac{xf}{g} = \{(x, -1), (1, -4), (-\frac{1}{x}, 4)\}$

سوال 14. $f(x) = \{(\frac{x}{1}, 1), (\frac{x}{2}, 1), (\frac{x}{3}, 1), (\frac{x}{4}, 1)\}$ $g(x) = \{(2, 1), (\frac{5}{2}, 1), (-\frac{2}{3}, 1), (-1, 2), (\frac{5}{3}, 2)\}$

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

سوال 15. $f(x) = \frac{\sqrt{x^2 - x}}{x - 2}$ $g(x) = [x] + [-x]$ $(\frac{f}{g+1})(x)$

$Dg = \mathbb{R} \cap Df = [0, \infty) - \{2\} = [0, \infty) - \{2\}$ $D(\frac{f}{g+1}) = \{0, 1, 2\}$

سوال 16. $f(x) = \sqrt{2x - x^2 - 4} \rightarrow -x^2 + 2x - 4 \geq 0$ $x^2 - 2x + 4 \leq 0$ $\frac{1}{x} - \frac{4}{x} +$

$Df = [1, 4]$ $g(x) = \{(1, 2), (2, 2), (4, 1), (2, 1)\}$ $f(1) = 0$ $f(2) = 0$ $f(4) = \sqrt{4}$

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

الف) $y = x^3 - 3x^2 + 5x \rightarrow x(x^2 - 3x + 5) = y \quad y-1 = (x-1)^2$ سؤال 17
 $\rightarrow x = \sqrt{y-1} + 1 \rightarrow Rf = \mathbb{R}$

ب) $y = \frac{1}{x^2 - 5x} \rightarrow yx^2 - 5yx - 1 = 0 \quad x = \frac{5y \pm \sqrt{25y^2 + 4y}}{2y}$
 $\{y^2 + 4y \geq 0, y \neq 0\} \quad \frac{-1}{+1 - \frac{1}{4}} \quad Rf = (-\infty, -1] \cup (0, +\infty)$

الف) $y = x^2 - 4x + 10$ سؤال 18
 $\Delta \left| \frac{b}{2a} = \frac{4}{2} = 2 \right. \quad Rf = [4, +\infty)$
 $4 - 16 + 10 = -2$

ب) $-x^2 + 9x + 5 = y \quad \Delta \left| \frac{b}{2a} = \frac{9}{-2} = -4.5 \right. \quad Rf = \left(-\infty, 14 \right]$
 $-9 + 18 + 5 = 14$

ج) $y = \sqrt{x^2 - 6x - 5}$ سؤال 19
 $\Delta \left| \frac{b}{2a} = \frac{3}{1} = 3 \right. \quad [-5, +\infty) \xrightarrow{\sqrt{\quad}} Rf = [0, +\infty)$
 $9 - 18 - 5 = -14$

د) $y = \sqrt{-x^2 + 4x}$ سؤال 20
 $\Delta \left| \frac{b}{2a} = \frac{-4}{-2} = 2 \right. \quad (-\infty, 4] \xrightarrow{\sqrt{\quad}} Rf = [0, 2]$
 $-9 + 18 = 9$

الف) $y = x^3 - 2x^2 + 5x + 1$ سؤال 21
 $Rf = \mathbb{R}$

ب) $y = x^3 - 9x^2 + 5x + 2$ سؤال 22
 $\Rightarrow Rf = \mathbb{R}$

ج) $y = \sqrt{x^3 - 4x^2 + 2x + 1}$ سؤال 23
 $\Rightarrow Rf = [0, +\infty)$

د) $y = (x^3 - 4x^2 + 5x + 1)^2$ سؤال 24
 $\Rightarrow Rf = [0, +\infty)$

الف) $y = \frac{5x+1}{x-2}$ سؤال 25
 $Rf = \mathbb{R} - \{5\}$

ب) $y = \frac{x+1}{x+1}$ سؤال 26
 $Rf = \mathbb{R} - \{1\}$