

الف) $D_f \subseteq [0, +\infty)$, $D_g = \mathbb{R}$ $\Rightarrow$ $f(x) = 2 \sin x (1 + \sin x - 2) = 2 \sin x (-1 + \sin x) = 2 \sin x - 2 \sin^2 x = g(x)$
 $D_f \Rightarrow$ $D_g = \mathbb{R}$
 $D_g = \mathbb{R}$
 $\Rightarrow f(x) = 1, g(x) = 1$
 $\Rightarrow D_f = D_g = \mathbb{R} - \{0\}$
 $\Rightarrow f(x) = 1, g(x) = -1$

سؤال 1
 $a = d = -1$
 $a - 2b = 1 \Rightarrow -2b = 2 \Rightarrow b = -1$
 $a - 2b = c \Rightarrow c = 1$
 $d + c = -1 + 1 = 0$

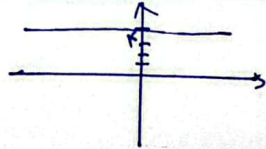
الف) $D_f = \mathbb{R} \Rightarrow D_g = \mathbb{R}$
 $\Rightarrow f(x) = 0, g(x) = [x] - \{x\}$
 $D_f = D_g = \mathbb{R} - \{0\}$
 $\Rightarrow f(x) = \frac{1}{x}, g(x) = \frac{1}{x}$
 $\Rightarrow f(x) = 1 - 2x, g(x) = 2 - 4x$

سؤال 9
 $f(x) = \sqrt{-(x^2 - x + 1)}$
 $g(x) = \sqrt{-(x^2 - x + 1)}$
 $\Delta = 0 \Rightarrow$
 $\Delta = 1 - 4 = -3 < 0 \Rightarrow m = \frac{1}{4}$

سؤال 3
 $f(x) + g(x) = x^2 + x + 1$
 $f(x) - g(x) = x^2 - x + 1$
 $\Rightarrow 2f(x) = 2(x^2 + 1) \Rightarrow f(x) = x^2 + 1 \Rightarrow g(x) = x$
 $f(x) - g(x) = (f(x) + g(x))(f(x) - g(x)) = (x^2 + 1 + x)(x^2 + 1 - x) = x^4 + x^2 + 1$
 $= x^2(x^2 + 1) + 1$

$\sqrt{-(x - \frac{1}{2})^2}$
 $(x - \frac{1}{2})^2 \neq 0 \Rightarrow x \neq \frac{1}{2}$
 $g(x) = \left\{ \left(\frac{1}{2}, 0 \right) \right\}$

سؤال 4
 $f \circ g = x^2 - (x^2 - 1) = 1$



سؤال 5
 $\frac{x-b}{x^2 - \frac{w}{y}x - \frac{a}{y}} = \frac{ax+r}{x^2 - mx+n} \Rightarrow \frac{x}{y} - \frac{b}{y} = ax+r$
 $\Rightarrow a = \frac{1}{y}, b = -r$
 $am - bn = \left(\frac{1}{y} \times \frac{w}{y} \right) - \left(-r \times \left(-\frac{a}{y} \right) \right) = \frac{w}{y^2} - \frac{ra}{y} = \frac{w - ra}{y^2}$

سؤال 10
 $f(x) = \frac{xn+a}{x^2+4x+b}$
 $\Rightarrow \frac{xn+a}{(x+c)^2} \Rightarrow x \neq -c$
 $\Rightarrow c = -2 \Rightarrow a = 9$
 $a + b + c = 12$

سؤال 6
 $\frac{bm+r}{am+b} = c \Rightarrow bm+r = acx+bc \Rightarrow b = \frac{r}{c}, -\frac{r}{c}$
 $\Rightarrow ad = bc \Rightarrow b^2 = 14 \Rightarrow b = \pm \sqrt{14}$
 $14x + r \neq 0 \Rightarrow 2x(x+7) \neq 0 \Rightarrow x \neq -\frac{7}{2} \Rightarrow \frac{ab}{c} = \frac{-\frac{1}{2} \times r}{\frac{1}{2}} = -r$
 $14x - 1 \neq 0 \Rightarrow x(x - \frac{1}{14}) \neq 0 \Rightarrow x \neq \frac{1}{14} \Rightarrow \frac{ab}{c} = \frac{-\frac{1}{2} \times (-1)}{\frac{1}{2}} = 1$

سؤال 7
 $f = \{(-1, 2), (2, 1), (3, -2), (0, \frac{1}{2})\}$
 $g = \{(-1, 4), (2, 1), (3, 4), (4, 0)\}$

$\frac{fg}{f+g} = \frac{\{(-1, 1), (2, 1), (3, 1), (4, 1)\}}{\{(-1, -2), (2, 1), (3, 1)\}} \Rightarrow R = \{-2, 1, 1\}$