

1	$f(x) = \begin{cases} (a+1)(x+2) & ; x \leq 1 \\ 2a+2x & ; x > 1 \end{cases}$ $f(2) = f(-2) + a \rightarrow 2((a+1)(2+2)) = 2a - 2 + a$ $12a + 4 = 2a - 2 \rightarrow 10a = -18 \rightarrow a = \frac{-18}{10} = -1.8$ جواب: -1.8
2	$f(x) = \sqrt{x} + \frac{1}{\sqrt{x}} + 2$ $f(2-\sqrt{2}) = \frac{\sqrt{2}-1}{\sqrt{2}} + \frac{1}{\sqrt{2}-1} + 2 = \frac{\sqrt{2}-1}{\sqrt{2}} + \frac{\sqrt{2}(\sqrt{2}+1)}{\sqrt{2}(\sqrt{2}-1)} + 2 = \frac{\sqrt{2}-1}{\sqrt{2}} + \frac{\sqrt{2}(\sqrt{2}+1)}{\sqrt{2}(\sqrt{2}-1)} + 2 = \sqrt{2} + 2$ $f(2+\sqrt{2}) = \frac{\sqrt{2}+1}{\sqrt{2}} + \frac{1}{\sqrt{2}+1} + 2 = \frac{\sqrt{2}+1}{\sqrt{2}} + \frac{\sqrt{2}(\sqrt{2}-1)}{\sqrt{2}(\sqrt{2}+1)} + 2 = \sqrt{2} + 2$ جواب: $2\sqrt{2} + 4$
3	$2f(x) - 3f(-x) = 2x^2 - x \rightarrow x^2$ $2f(-x) - 3f(x) = 2x^2 + x \rightarrow x^2$ $4f(x) - 9f(-x) = 12x^2 + 2x$ $-5f(x) = 2x^2 + x$ $f(x) = -\frac{2}{5}x^2 - \frac{x}{5}$ جواب: $f(x) = -\frac{2}{5}x^2 - \frac{x}{5}$
4	$(x+2)f(x) - 2xf(x+2) = 2x^2 - mx + 3m - 1$ $x=0 \rightarrow 2f(0) = 3m - 1$ $x=1 \rightarrow 4f(0) = 9m - 2$ $5m + 18 = 9m - 2 \rightarrow 4m = 18 \rightarrow m = \frac{9}{2}$ $x=-1 \rightarrow 4f(0) = 14 + 2m + 3m - 1 \rightarrow 4f(0) = 5m + 15$ $4f(0) = 5 \times \frac{9}{2} + 15 \rightarrow f(0) = \frac{35}{4}$ جواب: $\frac{35}{4}$
5	$f(x) + f\left(\frac{1}{x}\right) = \frac{2x^2 - 12x + 2}{x}$ $ax + b + \frac{a}{x} + b = \frac{2x^2 - 12x + 2}{x} \rightarrow ax^2 + bx + a = \frac{2x^2 - 12x + 2}{x}$ $f(-1) = -2 - 4 = -6$ جواب: -6
6	$f(x) = (x-1)\sqrt{1-x} \geq 0 \rightarrow 1-x \geq 0 \rightarrow x \leq 1$ $g(x) = 2 - \sqrt{1-x} \geq 0 \rightarrow (1-x) \geq 0 \rightarrow 1-x \geq 0 \rightarrow x \leq 1$ دو تابع هم نامبرند. جواب: $f(x) = g(x)$
7	$f(x) = x\sqrt{x} \geq 0 \rightarrow x \geq 0$ $g(x) = \sqrt{x^3} \geq 0 \rightarrow x^3 \geq 0 \rightarrow x \geq 0$ دو تابع هم نامبرند. جواب: $f(x) = g(x)$
8	$f(x) = [\sqrt{x}] - [\sqrt{x-1}] \quad x \geq 0 \quad D_f = [0, +\infty)$ $g(x) = \sqrt{x-1} \geq 0 \rightarrow x-1 \geq 0 \rightarrow x \geq 1 \rightarrow D_g = [1, +\infty)$ جواب: $f(x) = g(x)$
9	الف) $\left(\frac{f+g}{f-g}\right)(1) \rightarrow \frac{2+1}{2-1} = \frac{3}{1} = 3$ جواب: 3 ب) $\left(\frac{f+g}{f-g}\right)(2) \rightarrow \frac{3+2}{3-2} = \frac{5}{1} = 5$ جواب: 5 ج) $f(0)g(-1) \rightarrow 0 \times 1 = 0$ جواب: 0
10	الف) $g(x) = f(3x-1)$ $3x-1=2 \rightarrow x=1$ و $3x-1=-1 \rightarrow x=0$ و $3x-1=0 \rightarrow x=\frac{1}{3}$ و $3x-1=3 \rightarrow x=\frac{4}{3}$ جواب: $g(x) = \left\{ \left(\frac{1}{3}, 5\right), (1, 2), (2, -1), \left(\frac{4}{3}, 3\right) \right\}$ ب) $h(x) = f(x) \rightarrow x =2 \rightarrow x=\pm 2$ و $x =1 \rightarrow x=\pm 1$ و $x =0 \rightarrow x=0$ و $x =3 \rightarrow x=\pm 3$ جواب: $h(x) = \left\{ (2, 1), (-2, 1), (0, 5), (1, -1), (-1, -1), (3, 2), (-3, 2) \right\}$