

19, 18

	-4	-5	0	2	5
x	-	-	+	+	+
$f(x)$	+	0	-	-	0
$xf(x)$	-	+	-	+	+

$$\Rightarrow D_f = [-5, 0] \cup [2, 5]$$

(4)

	-3	0	2	5
x	-	+	+	-
$f(x)$	-	+	-	-
$xf(x)$	+	+	-	+

$$y = \sqrt{\frac{-x}{f(x)}} \Rightarrow \frac{-x}{f(x)} \Rightarrow f(x) \neq 0$$

برای $x=0$ و $x=2$ $f(x)=0$
 برابر با صفر

$$D_f = (-3, 0) \cup (0, 2)$$

(4)

مرد صبح ادا شد

$$\text{if } x=2 \rightarrow f(2) = 1^2 = 1 \rightarrow -f(2) = 1 \rightarrow f(2) = -1$$

$$\text{if } x=-2 \rightarrow f(-2) = 4 = 1^2 \rightarrow f(-2) = 1$$

(4)

$$f\left(\frac{1}{f(x)}\right) + f\left(\frac{1}{f(x)}\right) = 1 + 1 = 2$$

$$x - \sqrt{x+1} = 1$$

$$f(x) = \begin{cases} x - \sqrt{x+1} & x \geq 1 \\ 1x + 1 & x \leq 1 \end{cases}$$

(4)

$$f(x) = ax^2 - bx + 1$$

$$\hookrightarrow f(x-1) = a(x-1)^2 - b(x-1) + 1 = ax^2 - 2ax + a - bx + b + 1$$

$$f(x-1) - f(x) = ax^2 - 2ax + a - bx + b + 1 - (ax^2 - bx + 1) = -2ax + a + b$$

$$-2ax + a + b = 4x \rightarrow -2ax = 4x - a - b$$

$$-2a = 4 \rightarrow a = -2$$

$$a - b = -2 - a = -4 \rightarrow b = 2$$

$$f(\sqrt{3}-1) = \frac{(\sqrt{3}-1)^2 + 1(\sqrt{3}-1) + 1}{(\sqrt{3}-1)^2 + 1(\sqrt{3}-1) + 1} = \frac{3-2\sqrt{3}+1+\sqrt{3}-1+1}{3-2\sqrt{3}+1+\sqrt{3}-1+1} = \frac{2-\sqrt{3}}{2-\sqrt{3}}$$

6

$$f(x - \frac{1}{x}) = \frac{x^2 + 1}{x^2} \Rightarrow \frac{x^2}{x^2} + \frac{1}{x^2} = x^2 + \frac{1}{x^2}$$

7

$$f(x - \frac{1}{x}) = \frac{x^2 + 1}{x^2} - 1 + 1 \Rightarrow f(x) = x^2 + 1$$

$$f(-3) = (-3)^2 + 1 = 10$$

8

$$f(x) = \{x, 0\} \cup \{0, x\}$$

$$g(x) = \sqrt{9-x^2} \Rightarrow 9-x^2 \geq 0 \Rightarrow 9 \geq x^2 \Rightarrow \begin{cases} x \geq -3 \\ x \leq 3 \end{cases}$$

$$D(f) = \{(-2, 2) \cup (2, 0) \cup (0, 2) \cup (0, 3) \cup (3, 0) \cup (1, \sqrt{1})\}$$

9

$$a) f(x) = \{(-2, 2) \cup (2, 0) \cup (0, 2) \cup (0, 3) \cup (3, 0) \cup (1, \sqrt{1})\}$$

$$b) f(x) + 1 = \{(2, 2) \cup (3, 0) \cup (-2, 0) \cup (1, 1)\}$$

$$c) f^2(x) + 1 = \{(2, 4) \cup (3, 0) \cup (-2, 0) \cup (1, 1)\} \rightarrow (1, 1)$$

$$d) f(2x) = \{(1, 1) \cup (\frac{2}{3}, 0) \cup (-\frac{2}{3}, 0) \cup (\frac{1}{2}, -1)\}$$

10

$$a) f-g = \{(1, 1) \cup (2, 2) \cup (3, 2)\}$$

$$b) \frac{f}{g} = \{(2, 4) \cup (3, -1) \cup (1, \frac{1}{2})\}$$

11