

$$x f(x) \geq 0$$

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

$$(Df = [-\infty, 0] \cup [2, \infty])$$

۱

$$\frac{-x}{f(x)} \geq 0 \Rightarrow -x \geq 0, f(x) > 0$$

$$(Df = \underbrace{(-\infty, 0)}_{-2, -1} \cup \underbrace{(0, 2)}_{1} \cup \underbrace{(\infty, \infty)}_{2, 3, \dots})$$

کتابت علامت :

	-3	0	2	4
-x	+	+	-	-
f(x)	-	+	-	+
$\frac{-x}{f(x)}$	-	+	+	-

۲

شکل منحنی را در نظر بگیرید. $(-\infty, 0) \Rightarrow -2, -1$ و $(0, 2) \Rightarrow 1$ و $(\infty, \infty) \Rightarrow 2, 3, \dots$

شکل منحنی را در نظر بگیرید.

$$f(x) - 2f(2) = x^2 - 2x + 4, \quad f(-2) = ?$$

$$1) \quad f(2) = ? \xrightarrow{x=2} f(2) - 2f(2) = 4 - 4 + 4 = -f(2) = 2 \Rightarrow f(2) = -2$$

$$f(-2) \xrightarrow{x=-2} f(-2) - 2f(2) = 4 + 4 + 4 \Rightarrow f(-2) = 12 - 4 \Rightarrow f(-2) = 8$$

۳

$$f(x) = \begin{cases} x - \sqrt{x+4} & ; x > 4 \\ 2x+3 & ; x \leq 4 \end{cases}$$

$$* f(f(4)) + f(f(1)) = ?$$

$$1) \quad f(4) = 4 - \sqrt{4+4} = 4 - 2 = 2, \quad f(1) = (2 \times 1) + 3 = 5$$

$$2) \quad \text{پس } f(f(4)) + f(f(1)) = f(2) + f(5) = ?$$

$$2) \quad f(2) = (2 \times 2) + 3 = 7$$

$$\text{پس } f(f(4)) + f(f(1)) = f(2) + f(5) = 7 + 13 = 20$$

۴

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

$$f(x-1) - f(x) = 4x+2$$

$$(a-b) = ?$$

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

$$2) \quad f(x-1) - f(x) = ax^2 - 2ax + a - bx + b + 2 - ax^2 + bx - 2 = -2ax + a + b = 4x + 2$$

$$f(x-1) - f(x) = 4x + 2$$

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

$$\begin{cases} -2ax = 4x \rightarrow -2a = 4 \\ a = -2 \\ a + b = 2 \rightarrow -2 + b = 2 \\ b = 4 \end{cases}$$

$$* a - b = -2 - 4 = -6$$

۵

$f(x) = \frac{x^r + x + \omega}{x^r + x + v}, \quad f(\sqrt{r} - r) = ?$ $f(x) = \frac{x^r + x + \omega}{x^r + x + v} = \frac{(x^r + x + v) - r}{x^r + x + v} = 1 - \frac{r}{x^r + x + v}$ $f(\sqrt{r} - r) = 1 - \frac{r}{(\sqrt{r} - r)^r + (\sqrt{r} - r) + v} = 1 - \frac{r}{r + r - r\sqrt{r} + \sqrt{r} - r + v} = 1 - \frac{r}{v} = 1 - \frac{1}{\frac{v}{r}} = \frac{v}{r} *$ $\begin{cases} (\sqrt{r} - r)^r = r + r - r\sqrt{r} \\ f(\sqrt{r} - r) = r\sqrt{r} - r \end{cases}$ راه: $f(\sqrt{r} - r) = \frac{v}{r}$ است	6
$f(x - \frac{1}{x}) = \frac{x^r + 1}{x^r}, \quad f(\frac{1}{x}) = ?$ $f(x - \frac{1}{x}) = \frac{x^r + \frac{1}{x^r}}{x^r} \Rightarrow f(x - \frac{1}{x}) = (x - \frac{1}{x})^r + r$ $\xrightarrow{\quad} f(x) = x^r + r$ $f(r) = (x)^r + r = 9 + r = 11$	7
$g(x) = \sqrt{9 - x^r} \quad 9 - x^r \geq 0 \rightarrow -3 \leq x \leq 3 \Rightarrow [-3, 3] \quad f(x) = \{ (r, 0)^* (1, -r)^* (0, \frac{r}{r})^* (v, 1) \}$ * : شیب ا) $f_g = \{ (r, 0) (1, \frac{r}{\sqrt{r}}) (0, \frac{r}{r}) \} = \{ (r, 0), (1, -\sqrt{r}), (0, \frac{r}{r}) \}$ $\hookrightarrow \frac{r}{\sqrt{r}} \times \frac{\sqrt{r}}{\sqrt{r}} = \frac{r\sqrt{r}}{r} = \sqrt{r}$ ب) $\frac{g}{f} = \{ (r, \frac{\sqrt{r}}{r}) (1, \frac{\sqrt{r}}{-r}) (0, \frac{r}{r}) \} = \{ (1, -\frac{\sqrt{r}}{r}), (0, \frac{r}{r}) \}$ $\frac{-\sqrt{r}}{r}$	8
$f(x) = \{ (r, 1) (r, r) (-\omega, r) (1, -r) \}$ ا) $r f(x) = \{ (r, r) (r, 1) (-\omega, r) (1, -r) \}$ ب) $f(x) + 1 = \{ (r, r) (r, \omega) (-\omega, r) (1, -1) \}$ ج) $r f(x) + 1 = \{ (r, r) (r, r) (-\omega, r) (1, -1) \}$ $f(x) = \{ (r, 1) (r, 1) (-\omega, r) (1, -r) \} x^r + 1$ د) $f(rx) = \{ (1, 1) (\frac{r}{r}, r) (\frac{-\omega}{r}, r) (\frac{1}{r}, -r) \} = \{ (1, 1) (1, \omega, r) (-r, \omega, r) (r, \omega, -r) \}$ $\frac{r}{r} = 1$ $\frac{-\omega}{r} = -\omega$ $\frac{1}{r} = 1$ $\frac{-r}{r} = -1$	9
$g(x) = \{ (1, r)^* (r, 1) (-1, r) (-r, -r) (r, -1) \}$ $f(x) = \{ (r, r) (v, r) (1, r) (r, 1) (0, r) \}$ * : شیب ا) $f - g = \{ (1, r) (r, r) (r, r) \}$ ب) $\frac{rf}{g} = \{ (1, \frac{r}{r}) (r, r) (r, -r) \} = \{ (r, r) (r, -r) \}$ $r f(x) = \{ (r, r) (v, r) (1, r) (r, r) (0, r) \}$ □ : شیب	10