

$$y = \sqrt{x f(x)}$$

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

$$\text{در } (-4, -5) : \text{مثبت}$$

$$\text{در } (-5, 2) : \text{منفی}$$

$$\text{در } (2, 5) : \text{مثبت}$$

$$\begin{cases} x \geq 0, f(x) \geq 0 \Rightarrow [2, 5] \\ x \leq 0, f(x) \leq 0 \Rightarrow [-5, 0] \end{cases} \Rightarrow D_f = [-5, 0] \cup [2, 5]$$

✓

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

حالت اول: $f(x) < 0, x > 0$

حالت دوم: $f(x) > 0, x < 0$

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

صفحات تابع: $x=0, x=-3, x=2$

$$\Rightarrow D_f = (-3, 0) \cup (0, 2) \rightarrow \text{اعداد صحیح} = -2, -1, 1, 2$$

۱, ۵

$$f(x) - 2f(2) = x^2 - 3x + 4$$

$$\Rightarrow f(2) - 2f(2) = 2^2 - 3(2) + 4$$

$$\Rightarrow -f(2) = 4 - 4 + 4$$

$$\Rightarrow -f(2) = 4$$

$$\Rightarrow f(2) = -4$$

$$f(x) - 2f(2) = x^2 - 3x + 4$$

$$\Rightarrow f(2) - 2(-4) = 4 - 6 + 4$$

$$\Rightarrow f(2) + 8 = 2$$

$$\Rightarrow f(2) = -10$$

✓

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

$$f(1) = 2(1) + 3 = 5$$

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

$$f(2) = 2(2) + 3 = 7$$

$$f(7) = 7 - \sqrt{7+4} = 7 - 4 = 3$$

$$f(1) = 5 - \sqrt{5} = 2$$

$$f(2) + f(5) = 7 + 2 = 9$$

$$f(7) = 3$$

$$f(3) = 3 - \sqrt{3+4} = 3 - \sqrt{7}$$

✓

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

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

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

$$\Rightarrow a(x^2 - 2x + 1) - b(x-1) + 2$$

$$\Rightarrow ax^2 - 2ax + a - bx + b + 2$$

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

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

$$-2a = 4 \Rightarrow a = -2$$

$$a + b = 2 \Rightarrow -2 + b = 2 \Rightarrow b = 4$$

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

✓

$f(x) = x^r - \frac{1}{2}x + 1$ $\frac{rf(r) + f(-1)}{f'(r)} = ?$	$f(r) = r^r - \frac{1}{2}r + 1 = 9 - 4 + 1 = 1$ $f(-1) = (-1)^r - \frac{1}{2}(-1) + 1 = 1 + \frac{1}{2} + 1 = \frac{5}{2}$ $f'(r) = r^r - \frac{1}{2}r + 1 = 1 - 4 + 1 = -1$ $\rightarrow \frac{rf(r) + f(-1)}{f'(r)} = \frac{r(1) + \frac{5}{2}}{(-1)^r} = \frac{r + \frac{5}{2}}{1} = \boxed{V}$	6
$f(x) = \begin{cases} r(x+1) & x \geq r \\ x^r & x < r \end{cases}$ $\frac{rf(r) - rf(-r)}{f(r)} = ?$	$f(r) = r(r+1) = 11^r$ $f(-r) = (-r)^r = r^r$ $f'(r) = r^r + 1 = V$ $\rightarrow \frac{rf(r) - rf(-r)}{f(r)} = \frac{r(11^r) - r(r^r)}{V} = \frac{r(9 - 1)}{V} = \boxed{\frac{r}{V}}$	7
$f = \{(r, 4), (r^r, 1), (1, 4), (1, r^r)\}$ $\frac{f(f(r)) - f(f(r^r))}{f(1) - r} = ?$	$f(r) = 1 \rightarrow f(1) = 4$ $f(r^r) = r \rightarrow f(r) = 4$ $\rightarrow \frac{f(f(r)) - f(f(r^r))}{f(1) - r} = \frac{f(1) - f(r)}{4 - r} = \frac{4 - 4}{4 - r} = \frac{0}{r} = \boxed{0}$	8
$f(x) = \frac{x^r + rx + 9}{x^r + rx + 5}$ $f(f(\sqrt{r-1})) = ?$	if $x = \sqrt{r-1} \Rightarrow x+r = \sqrt{r}$ $\Rightarrow x^r + rx + 9 = (x+r)^r + 5 \Rightarrow (\sqrt{r})^r + 5 = 14 = 9 + 5 = 14$ $\Rightarrow x^r + rx + 5 = (x+r)^r + 1 \Rightarrow (\sqrt{r})^r + 1 = r + 1 = f$ $\rightarrow f(r) = \frac{(r)^r + r(r) + 9}{(r)^r + r(r) + 5} = \frac{f + 14 + 9}{f + 14 + 5} = \boxed{\frac{r}{14}}$	9
$f(x) = x^r + \frac{1}{x^r}$ $(f(\sqrt{x}))^r - f(x) = ?$	$f(\sqrt{x}) = (\sqrt{x})^r + \frac{1}{(\sqrt{x})^r} = x + \frac{1}{x}$ $\downarrow$ $(f(\sqrt{x}))^r - f(x) = ?$ $\downarrow$ $(x + \frac{1}{x})^r - (x^r + \frac{1}{x^r}) = x^r + \frac{1}{x^r} - x^r - \frac{1}{x^r} = \boxed{r}$	10