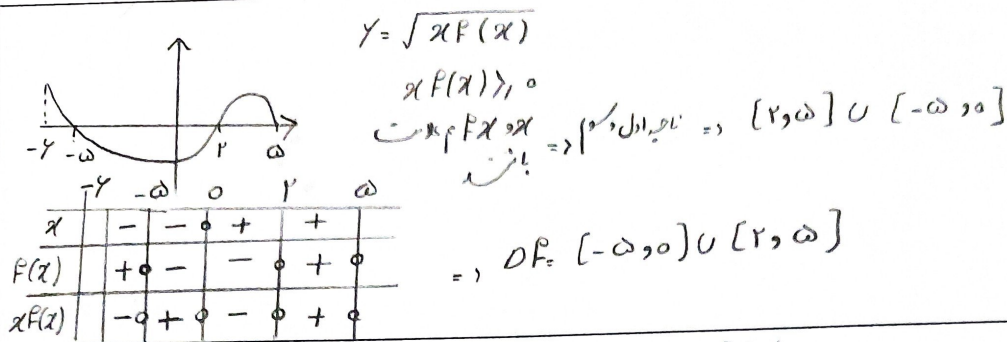
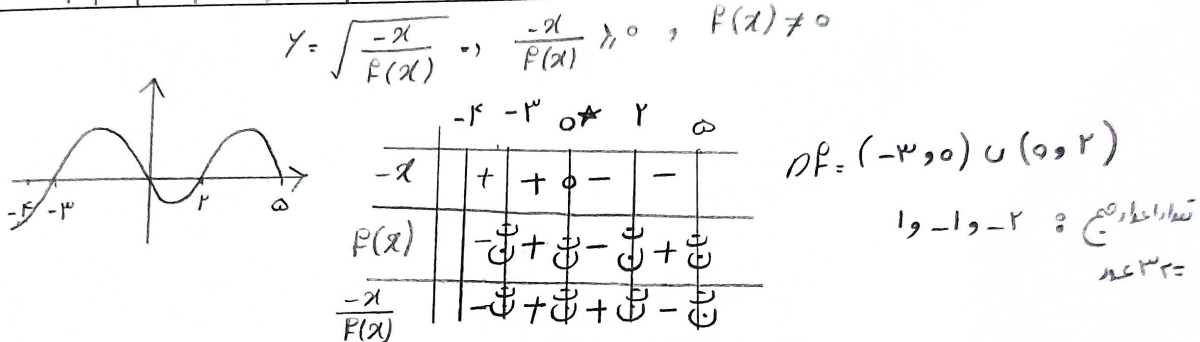




1



2

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

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

$-f(2) = 2$

$f(2) = -2$

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

$f(-2) = 4 + 6 + 4 + (-4) = 10$

3

$f(f(5)) + f(f(1)) \Rightarrow f(1) = 1 \times 1 + 3 = 5$

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

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

$7 + 2 = 9$

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

4

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

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

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

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

$-2ax + a + b = 2x + 2 \Rightarrow -2a = 2 \Rightarrow a = -1$

$a + b = 2 \Rightarrow -1 + b = 2 \Rightarrow b = 3$

$a - b = -1 - 3 = -4$

5

$$f(x) = \frac{x^r + rx + r}{x^r + rx + r} \Rightarrow \frac{(x+r)^{r+1}}{(x+r)^{r+1}} \Rightarrow f(\sqrt{r}-r) \Rightarrow \frac{(\sqrt{r}-r+r)^{r+1}}{(\sqrt{r}-r+r)^{r+1}} = \frac{f}{f}$$

$$= \frac{r}{r}$$

6

$$f\left(x - \frac{1}{x}\right) = \frac{x^{r+1}}{x^r}$$

$$\Rightarrow \left(x - \frac{1}{x}\right)^r = x^r + \frac{1}{x^r} - r \Rightarrow \left[\frac{x^{r+1}}{x^r} - r\right] + r \Rightarrow f(x) = x^r + r$$

$$f(-r) \Rightarrow (-r)^r + r = 11$$

7

$$f(x) = \{(r, 0), (1, -r), (0, r), (r, 1)\}$$

$$g(x) = \sqrt{r-x^2} \Rightarrow \sqrt{(r+x)(r-x)} \quad \frac{-r}{-r+r} = \frac{r}{r} \quad Df \cap Dg = \{0, 1, r\}$$

$$الف) \frac{f}{g} = \left\{(0, \frac{r}{r}), (1, \frac{-r}{\sqrt{r}}), (r, \frac{0}{\sqrt{0}})\right\}$$

$$g(0) = \sqrt{r-0} = r \quad g(1) = \sqrt{r-1} = \sqrt{r} \quad g(r) = \sqrt{r-r} = 0$$

$$ب) \frac{g}{f} = \left\{(0, \frac{r}{r}), (1, \frac{\sqrt{r}}{-r}), (r, \frac{\sqrt{0}}{r})\right\} \Rightarrow \left\{(0, \frac{r}{r}), (1, \frac{\sqrt{r}}{-r})\right\}$$

8

$$f(x) = \{(r, 1), (r, r), (-r, r), (1, -r)\}$$

$$الف) rf(x) \Rightarrow \{(r, r), (r, r^2), (-r, r^2), (1, -r^2)\}$$

$$ب) f(x) + 1 \Rightarrow \{(r, r+1), (r, r^2+1), (-r, r+1), (1, -r+1)\}$$

$$ج) rf^2(x) + 1 \Rightarrow \{(r, r^2+1), (r, r^4+1), (-r, r^2+1), (1, r^2+1)\}$$

$$د) f(rx) \Rightarrow \{(1, 1), (\frac{r}{r}, r), (\frac{-r}{r}, r), (\frac{1}{r}, -r)\}$$

9

$$f(x) = \{(r, r), (r, r^2), (1, r), (r, 1), (r, r)\}$$

$$g(x) = \{(1, 0), (r, 1), (-1, r), (-r, r), (r, -1)\}$$

$$الف) f-g = \{(1, r), (r, r), (r, r)\}$$

$$r, 0 = r \quad r, 1 = r \quad 1, -1 = r$$

10

$$ب) \frac{rf}{g} = \frac{rf}{g} = \left\{(r, r), (r, r^2), (1, r), (r, 1), (r, r)\right\}$$

$$\frac{rf}{g} = \left\{(1, \frac{r}{r}), (r, \frac{r^2}{r}), (r, \frac{r}{r})\right\} \Rightarrow \left\{(1, \frac{r}{r}), (r, \frac{r}{r})\right\}$$