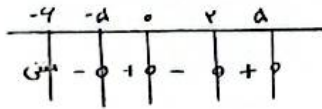


$$x \neq 0 \rightarrow f(x) > 0$$

$$f(x) = -a, r, a$$

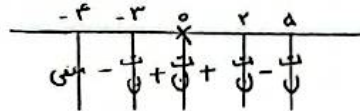


$$D_f = [-a, 0] \cup [r, a]$$

١

$$-x \neq 0 \rightarrow f(x) > 0$$

$$f(x) = -r, r, 0, a$$



$$D_f = (-r, 0) \cup (0, r) \rightarrow \text{مجموع: } -r, -1, 1 \rightarrow n=3$$

٢

$$f(r) - r f(r) = f - 4 + r = r \rightarrow f(r) = -r$$

$$f(-r) - r f(-r) = (-r)^2 - r(-r) + f$$

$$f(-r) = -f + f + 4 + r = 10$$

٣

$$f(1) = r + r = a \rightarrow f(a) = a - \sqrt{a+r} = \sqrt{r}$$

$$f(a) = r \rightarrow f(r) = f + r = \sqrt{r} \quad \left\{ \begin{array}{l} r+r=a \\ r+r=9 \end{array} \right.$$

٤

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

$$ax^2 + a - 2ax = bx + b + r - ax^2 + bx - r = 4x + r$$

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

$$a - b = -r - a = -8$$

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

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

٥

$$f(x - \frac{1}{x}) = \frac{x^2 + 1}{x^2} \rightarrow x^2 + \frac{1}{x^2} + r - r \rightarrow (x - \frac{1}{x})^2 + r \rightarrow f(-r) = (-r)^2 + r = 11$$

٦

$$f, \frac{f}{g} \rightarrow D_f = \{r, 1, 0, r\}, D_g = 9 - x^2 \rightarrow x^2 < 9 \rightarrow -3 < x < 3 \rightarrow [-3, 3]$$

٧

$$D_{\frac{f}{g}} = D_f \cap D_g = \{x \mid g(x) \neq 0\} = \{0, 1, r\} - \{\pm 3\} \rightarrow \{0, 1, r\} \rightarrow \left\{ \left(r, \frac{0}{\sqrt{a}} \right), \left(1, \frac{-r}{\sqrt{r}} \right), \left(0, \frac{r}{r} \right) \right\}$$

$$\text{ب } D_{\frac{g}{f}} = D_g \cap D_f = \{x \mid f(x) \neq 0\} = \{0, 1, r\} - \{r\} = \{0, 1\} \rightarrow \left\{ \left(1, \frac{\sqrt{r}}{-r} \right), \left(0, \frac{r}{r} \right) \right\}$$

۳-۱

الف) $\{(2, 2), (3, 8), (-5, 4), (1, -4)\}$

ب) $\{(2, 2), (3, 5), (-5, 3), (1, -1)\}$

ج) $\{(2, 4), (3, 49), (-5, 13), (1, 13)\}$

د) $\{(1, 1), (\frac{4}{3}, 4), (-\frac{5}{3}, 2), (\frac{1}{3}, -2)\}$

۳-۱

الف) $f - g = \{(2, 2), (1, 4), (3, 2)\}$

ب) $\frac{2f}{g} = \{(2, 4), (1, \frac{1}{g}), (3, -2)\}$
 که تعریف نشده