

$$\frac{x^2 + 4x + 4}{x^2 + 4x + 4} = \frac{(x+2)^2 + 1}{(x+2)^2 + 4} = \frac{2+1}{2+4} = \frac{3}{6} = \frac{1}{2}$$

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$$\left(x - \frac{1}{x}\right)^2 = x^2 + \frac{1}{x^2} - 2 = \frac{x^4 + 1}{x^2} - 2$$

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$$f(z) = \frac{z^4 + 1}{z^2} = z^2 + \frac{1}{z^2} \Rightarrow (-z^2)^2 + 1 = 1 \Rightarrow f(-z) = 1$$

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$$g(x) = \sqrt{a - x^2} \Rightarrow a - x^2 \geq 0 \Rightarrow (x - a)(x + a) \geq 0 \quad -\frac{x}{\sqrt{a-x^2}} - \frac{x}{\sqrt{a-x^2}}$$

$$\frac{f}{g} = \left\{ \left(1, \frac{0}{\sqrt{2}}\right), \left(1, \frac{-\sqrt{2}}{\sqrt{2}}\right), \left(0, \frac{1}{\sqrt{2}}\right) \right\} = \left\{ (x, 0), (1, -\sqrt{2}), \left(0, \frac{1}{\sqrt{2}}\right) \right\}$$

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$$\frac{g}{f} = \left\{ \left(1, \frac{\sqrt{2}}{0}\right), \left(1, \frac{-\sqrt{2}}{1}\right), \left(0, \frac{1}{\sqrt{2}}\right) \right\}$$

$$f \circ f(x) = \left\{ (x, x), (x, 1), (-1, x), (-1, -1) \right\}$$

$$f(x+1) = \left\{ (x, x), (x, 1), (-1, x), (-1, -1) \right\}$$

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$$g \circ f(x+1) = \left\{ (x, x), (-1, x), (-1, -1) \right\}$$

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

$$f - g = \left\{ (1, x), (x, x), (x, x) \right\}$$

2

$$\frac{x}{g} = \left\{ \left(1, \frac{1}{0}\right), \left(x, \frac{1}{1}\right), \left(x, \frac{1}{-1}\right) \right\}$$

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$$x f(x) \geq 0 \Rightarrow x \text{ و } f(x) \text{ هم علامت یا باید هر دو مثبت باشند یا باید هر دو منفی باشند}$$

$$y \text{ و } 0 \text{ و } -5 \Rightarrow y = -5 \text{ و } 0$$

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$$\frac{-x}{f(x)} \geq 0 \Rightarrow x \text{ و } f(x) \text{ نهایه هم علامت باشند}$$

$$f(x) \neq 0 \Rightarrow x \neq -5 \text{ و } 0$$

باید نمودار در ربع دوم و چهارم باشد

$$D_f = (-5, 0) \cup (0, 5)$$

۳ عدد صحیح در این بازه است

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$$f(x) - y f\left(\frac{y}{x}\right) = x^y - y x + y \xrightarrow{x=y} f(y) - y f(y) = y - y + y = y$$

$$-f(y) = y \Rightarrow f(y) = -y$$

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$$f(-y) - y x (-y) = (-y)^y - y^y x (-y) + y = y + y + y = 3y$$

$$f(-y) + y = 3y \Rightarrow f(-y) = 2y$$

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$$f(f(a)) + f(f(1)) = f(a - \sqrt{a+4}) + \underbrace{f(yx + y)}_{f(a)} = f(y) + f(a)$$

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$$f(y) + f(a) = yx + y + a - \sqrt{a+4} = y + y + a - y = a$$

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

$$= ax^y - yax + a - bx + y - ax^y + bx - y = -yax + a + b$$

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$$-yax + a + b = yx + y \Rightarrow a = -y, b = y$$

$$a - b = -y - y = -2y$$