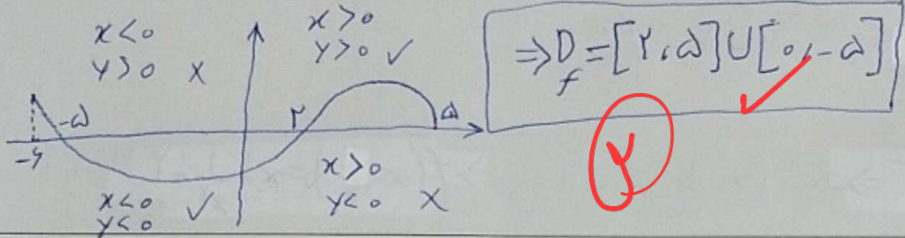


$y = \sqrt{xf(x)} \rightarrow \sqrt{xf(x)} \geq 0 \Rightarrow xf(x) \geq 0$

- $x > 0, f(x) \geq 0 \Rightarrow y \geq 0$
- $x < 0, f(x) \leq 0 \Rightarrow y \leq 0$

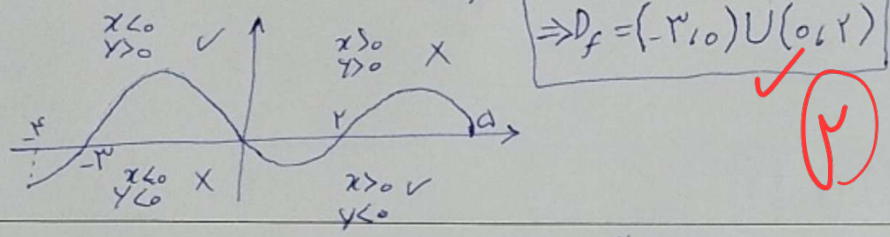


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$y = \sqrt{\frac{-x}{f(x)}} \rightarrow \frac{-x}{f(x)} \geq 0$

- $x > 0, f(x) \leq 0$
- $x < 0, f(x) \geq 0$

$f(x) \neq 0$



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$f(x) - yf(y) = x^y - y^y x + y^y \xrightarrow{x=y} f(y) - yf(y) = y^y - (y^y y) + y^y \Rightarrow -f(y) = y - y + y^y = y^y$
 $\Rightarrow f(y) = -y^y$

$f(-y) - y(-y) = (-y)^y - (y^y (-y)) + y^y \Rightarrow f(-y) + y^y = y^y + y + y^y \Rightarrow f(-y) = 0$

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$f(f(a)) + f(f(1)) = 7 + 2 = 9$

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

$f(a) = a - \sqrt{a+3} = a - \sqrt{9} = a - 3 = 2$

$f(2) = 2(2) + 3 = 4 + 3 = 7$

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

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

$x \rightarrow x-1 \rightarrow f(x-1) = a(x^y + 1 - yx) - b(x-1) + y = ax^y + a - yxa - bx + b + y$

$f(x-1) - f(x) = 9x + 2 \Rightarrow ax^y + a - yxa - bx + b + y - ax^y + bx - y = 9x + 2$

$\Rightarrow a - yxa + b = 9x + 2 \rightarrow -yxa = 9x \Rightarrow a = -3 \rightarrow -3 + b = 2 \Rightarrow b = 5$

$\Rightarrow a - b = -3 - 5 = -8$

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$$f(x) = \frac{x^2 + 2x + 1}{x^2 + 2x + 1} \Rightarrow f(x) = \frac{V - 2\sqrt{V} + 2\sqrt{V} - \Lambda + \omega}{V - 2\sqrt{V} + 2\sqrt{V} - \Lambda + V} = \frac{V - \Lambda + \omega}{V - \Lambda + V} = \frac{f}{g} = \frac{f}{g}$$

$$\Rightarrow f(\sqrt{V-2}) = \frac{f}{g}$$

$$(\sqrt{V-2})^2 = V + 2 - 2\sqrt{V} = V - 2\sqrt{V}$$

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6

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

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

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7

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

$$\sqrt{9-x^2} > 0 \Rightarrow 9-x^2 > 0 \Rightarrow x^2 < 9 \Rightarrow -3 < x < 3$$

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

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8

$$f \neq 0 \Rightarrow (x, 0) \notin \frac{f}{g}$$

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

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

$$c) 3f^2(x) + 1 = \left\{ (2, 4), (2, 9), (-2, 13), (1, 13) \right\}$$

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

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$$a) f-g = \left\{ (2, 2), (2, 2), (1, 2) \right\}$$

$$b) \frac{2f}{g} = \left\{ (2, 6), (2, -2) \right\}$$

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