

$x f(x) \geq 0 \quad f(x) = 0$
 $\downarrow$
 $-8, 2, 8$

-8	-8	0	2	8
-	-	+	-	+

$\Rightarrow x \in [-8, 0] \cup [2, 8]$

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$\frac{-x}{f(x)} > 0 \quad \& f(x) \neq 0 \quad \Rightarrow \frac{x}{f(x)} \leq 0$

-8	-3	0*	2	8
+	+	-	-	+

$x \in (-3, 2) \quad \{0\}$
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$f(2) - 2f(2) = 8 - 4 + 8 = 2$
 $-f(2) = 2$
 $f(2) = -2$

$f(-2) - 2(-2) = 8 + 4 + 8$
 $f(-2) + 4 = 16$
 $f(-2) = 12$

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$f(f(0)) + f(f(1)) = f(2) + f(8)$
 $f(8) = 8 - \sqrt{8+8} = 8 - 4 = 4$
 $f(1) = 2 + 3 = 5$
 $f(2) = 2$

$\sqrt{+2} = 4$

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$f(x-1) - f(x) = 9x + 2$
 $f(x-1) = a(x-1)^2 - b(x-1) + 2$
 $a(x^2 - 2x + 1) - bx + b + 2$

$f(x) = ax^2 - bx + 2$
 $-bx + 2 = 9x + 2 \Rightarrow b = -9$
 $a - b = -1 \Rightarrow a = 8$

$f(x-1) \rightarrow ax^2 - 2ax + a - bx + b + 2 = 9x + 2$
 $-2ax + a + b = 9x + 2 \Rightarrow -2a = 9 \Rightarrow a = -4.5$
 $-2a = 9 \Rightarrow a = -4.5$

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$$f(x) = \frac{x^r + \varepsilon x + \delta}{x^r + \varepsilon x + \nu}$$

$$\Rightarrow$$

$$f(\sqrt{r}-r) = \frac{(\sqrt{r}-r)^r + \varepsilon(\sqrt{r}-r) + \delta}{(\sqrt{r}-r)^r + \varepsilon(\sqrt{r}-r) + \nu} = \frac{r+\varepsilon - \varepsilon\sqrt{r} + \varepsilon\sqrt{r} - 1 + \delta}{r+\varepsilon - \varepsilon\sqrt{r} + \varepsilon\sqrt{r} - 1 + \nu} = \frac{\varepsilon}{\nu} = \frac{\varepsilon}{1-\nu}$$

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

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

$$f(-r) = (-r)^r + r = 1$$

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الف) $\frac{f}{g} = \left\{ \left(2, \frac{0}{\sqrt{8}}\right), \left(1, \frac{-\varepsilon}{\sqrt{8}}\right), \left(0, \frac{\varepsilon}{\sqrt{8}}\right) \right\}$

ب) $\frac{g}{f} = \left\{ \left(2, \frac{\sqrt{8}}{0}\right), \left(1, \frac{\sqrt{8}}{-\varepsilon}\right), \left(0, \frac{\varepsilon}{\sqrt{8}}\right) \right\}$

$$\begin{cases} g(x) = \sqrt{9-x^2} \\ \Rightarrow 9-x^2 \geq 0 \Rightarrow x^2 \leq 9 \\ \Rightarrow x \leq 3, x \geq -3 \\ [-3, 3] \cap f(x) = 2, 1, 0 \end{cases}$$

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الف) $f(x) = \{(1, 2), (2, 1), (-\delta, \varepsilon), (1, -\varepsilon)\}$

ب) $f(x) + 1 = \{(1, 2), (2, \delta), (-\delta, \varepsilon), (1, -1)\}$

ج) $rf'(x) + 1 = \{(1, \varepsilon), (2, \varepsilon), (-\delta, 1), (1, 1)\}$

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

$2x = 1 \Rightarrow x = \frac{1}{2}$ $2x = \frac{\varepsilon}{r} \Rightarrow x = \frac{\varepsilon}{2r}$ $2x = \frac{-\delta}{r} \Rightarrow x = \frac{-\delta}{2r}$ $2x = 1 \Rightarrow x = \frac{1}{2}$

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$$f(x) \cap g(x) = \{1, 2, 3\}$$

الف) $f-g = \{(1, \varepsilon-0), (2, \varepsilon-1), (3, 1-(-1))\} = \{(1, \varepsilon), (2, \varepsilon-1), (3, 2)\}$

ب) $\frac{f}{g} = \left\{ \left(1, \frac{\varepsilon}{0}\right), \left(2, \frac{\varepsilon}{1}\right), \left(3, \frac{1}{-1}\right) \right\} = \{(2, \varepsilon), (3, -1)\}$

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