

$$f(x) = -\frac{1}{x}x + 1$$

$$D = \{1, 2, 3, \dots, 9\}$$

$$x=1 \sim -\frac{1}{1} + 1$$

$$x=2 \sim -\frac{2}{2} + 1$$

$$x=3 \sim -1 + 1$$

$$x=4 \sim -\frac{4}{4} + 1$$

$$x=5 \sim -\frac{5}{5} + 1$$

$$x=6 \sim -\frac{6}{6} + 1$$

$$x=7 \sim -\frac{7}{7} + 1$$

$$x=8 \sim -\frac{8}{8} + 1$$

$$x=9 \sim -\frac{9}{9} + 1$$

$$g(x) = 90 + \frac{(-1-2-3-4-5-6-7-8-9)}{9}$$

$$g(x) = 90 - 10 = 80$$

$$f(x) = \sqrt{ax^2 + bx + c} \sim [r, \infty), f(r) = 1$$

$$g(x) = \sqrt{bx^2 + ax + c}$$

$$\begin{cases} f(r) = 0 \sim 2b + c = 0 \\ f(r) = 1 \sim 4b + c = 1 \end{cases} \rightarrow b = 1, c = -2$$

$$g(x) = \sqrt{x^2 + 2} \sim R = [0, \infty)$$

$$f(x) = \frac{x^2 - 4x}{x + 2}$$

$$D = R - \{a, b\}, R = [c, \infty) - \{N\}$$

$$F\left(\frac{a+b}{2}\right)$$

$$\frac{x(x-4)}{x+2} = \frac{x(x-2)(x+2)}{x+2} = x(x-2) \sim x^2 - 2x = 1 \sim (x-2)(x+2) = 0$$

$$a = -2, b = 4$$

$$\frac{-b}{2a} = \frac{-4}{-2} = 2 \sim y = -1$$

$$f\left(\frac{a+b}{2}\right) = f(-1) = 1 + 2 = 3$$

$$g(x) = \sqrt{x^3 + ax^2 + bx - 1}$$

$$D = [a, b]$$

$$R = ?$$

$$g(x) = ax + b \sim (x^3 + ax^2 + bx - 1) = (ax + b)^3 \sim (ax - 1)^3 = x^3 - 3ax^2 + 3a^2x - 1$$

$$\Rightarrow a = -3, b = 1$$

$$D = [-3, 1]$$

$$x = -3 \sim y = -1$$

$$x = 1 \sim y = 1$$

$$R = [-1, 1]$$

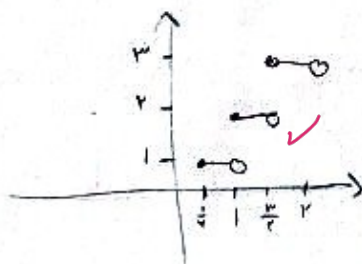
$$g(x) = [x] + [x + \frac{1}{2}]$$

$$[\frac{1}{2}, 1]$$

$$\frac{1}{2} \leq x < 1 \sim [x] = 0 + [x + \frac{1}{2}] = 1$$

$$1 \leq x < \frac{3}{2} \sim [x] + [x + \frac{1}{2}] = 2$$

$$\frac{3}{2} \leq x < 2 \sim [x] + [x + \frac{1}{2}] = 3$$



جواب

الف) $f(x) = 2 \sin^2(x + \frac{\pi}{4}) - 1$

ب) $f(x) = 2 \cos^2 x - 1$

$$f(x) = 2 \sin^2(x + \frac{\pi}{4}) - 1$$

$$f(x) = 2 \cos^2 x - 1$$

$$-1 \leq \sin x \leq 1 \sim -1 \leq \sin^2 x \leq 1$$

$$-1 \leq \cos x \leq 1 \sim -1 \leq \cos^2 x \leq 1$$

$$\rightarrow 0 \leq 2 \sin^2 x \leq 2 \sim -1 \leq 2 \sin^2 x \leq 1$$

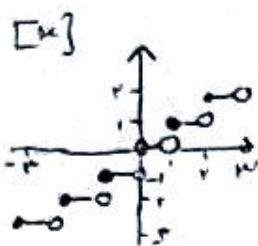
$$\rightarrow -1 \leq 2 \cos^2 x \leq 1 \sim -1 \leq 2 \cos^2 x \leq 1$$

$$\rightarrow -1 \leq 2 \cos^2 x - 1 \leq 1$$

$$\rightarrow R = [-1, 1]$$

$$R = [-1, 1]$$

$$y = \frac{x}{|x|} + [x]$$

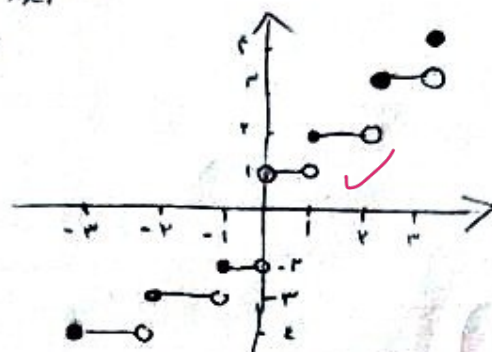


$$x > 0 \sim 1 + [x]$$

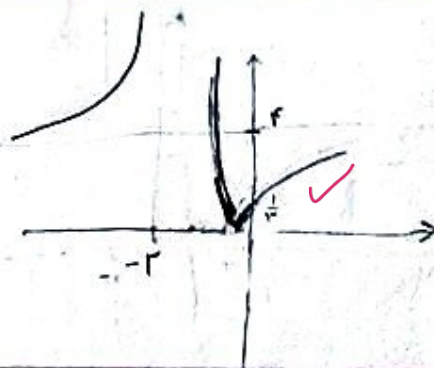
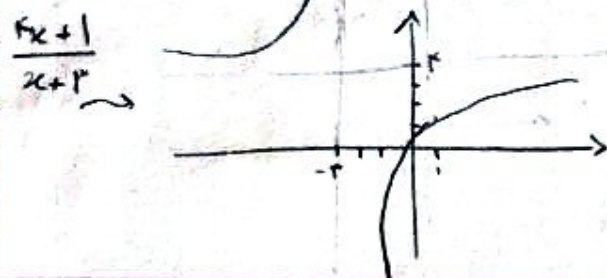
$$x < 0 \sim -1 + [x]$$

$$x \neq 0$$

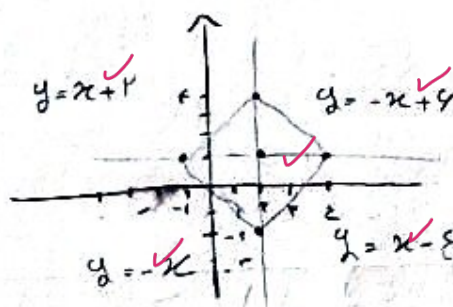
$$y = \frac{x}{|x|} + [x]$$



$$y = \left| \frac{x+1}{x+2} \right|$$



$$|x-1| + |y-1| = 1$$



$$f(x) = x + \frac{1}{x} + \sqrt{x + \frac{1}{x}}$$

$$g(x) = (x - \sin x)(1 + \sin x)$$

$$\sqrt{x + \frac{1}{x}} = a \sim a^2 + \frac{1}{a^2}$$

$$\sin x = 1 \sim x = \frac{\pi}{2}$$

$$\sin x = -1 \sim x = \frac{3\pi}{2}$$

$$\frac{1}{x} = -1 \sim x = -1$$

$$x + \frac{1}{x} = 2 \sim a = \sqrt{2}$$

$$x \rightarrow +\infty \sim \frac{1}{x} \rightarrow 0$$

$$\frac{1}{x} = -1 \sim x = -1$$

$$R = [1 + \sqrt{2}, \infty)$$

$$R = [0, \frac{\pi}{2}]$$