

$$A \times B = \{(1,1)(1,2)(2,1)(2,2)(3,1)(3,2)\}$$

(2)

$$B \times B = \{(1,1)(1,2)(2,1)(2,2)\}$$

$$A \times B = B^A = \{(1,1)(1,2)\} \quad \checkmark$$

$$\text{الف) } f(x) = \{(x, m^x), (x, 1)(-x, m)(-x, m)(x, m+1)(m, x)\}$$

-2

$$m^x = m+x$$

$$m^x - m - x = 0 \Rightarrow \begin{matrix} \text{because } m = -1 \\ m = +1 \end{matrix} \Rightarrow m = -1 \quad \checkmark$$

(2)

$$\text{ب) } f(x) = \{(x, m^x)(x, 1)(m, x)(x, m+1)(-x, m)(-1, x)\}$$

$$m^x = m+x$$

$$m^x - m - x = 0 \Rightarrow \begin{matrix} b = \text{const.} \\ m = -1 \\ m = +1 \end{matrix} \Rightarrow m = -1 \quad \checkmark$$

$$f(x) = \begin{cases} x-1 & ; x \leq 1 \\ ax+b & ; 1 < x < 2 \\ 2^x & ; x \geq 2 \end{cases} \Rightarrow \begin{matrix} a=1 \\ 1+b = a+b \\ 2+b = 2 \end{matrix} \Rightarrow \begin{matrix} 1+b = a+b \\ 2+b = 2 \end{matrix} \Rightarrow \begin{matrix} a=1 \\ b=0 \end{matrix}$$

-3

(2)

$$\begin{matrix} a+b=0 \\ a=1 \\ b=-1 \end{matrix} \quad a+b = 1-1 = 0 \quad \checkmark$$

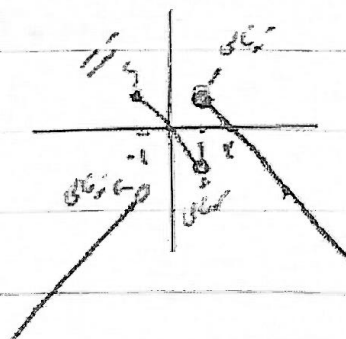
$$f(x) = \begin{cases} x-1 & ; x \geq K \\ f(x) & ; x < K \end{cases} \Rightarrow \begin{matrix} x=K \\ K-1 = f(K) \\ dK = V \end{matrix}$$

-4

(2)

$$K = \frac{V}{d} = 1.5 \quad \checkmark$$

$$f(x) = \begin{cases} -x+1 & ; x > 1 \\ -x & ; -1 \leq x \leq 1 \\ x-1 & ; x < -1 \end{cases}$$



$$\begin{matrix} Df = R - \{1\} \\ Rf = (-\infty, 1] \end{matrix}$$

(2)

-5

✓

الف) $xy'' + x^2 + 1 = 0$ if $(x, y_1) \in f$ $\Rightarrow y_1 = y_2$ (2)

$$xy_1'' + x^2 + 1 = 0$$

$$xy_1'' = -x^2 - 1$$

$$xy_1'' = xy_2'' \Rightarrow y_1'' = y_2'' = y_1' = y_2'$$

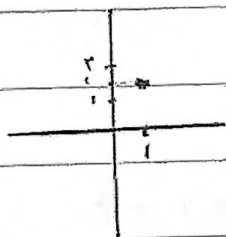
$$xy_2'' + x^2 + 1 = 0$$

$$xy_2'' = -x^2 - 1$$

تابع است ✓

ب) $x^2 + 4y^2 - 2x - 12y + 10 = 0 \Rightarrow (x^2 - 2x + 1) + (4y^2 - 12y + 9)$

$$(x-1)^2 + (2y-3)^2 = 0 \Rightarrow$$



نقطه است

تابع است ✓

$$(x=1) \quad (y=1.5)$$

الف) $x \sin y = y \sin x \xrightarrow{a=0} 0 \sin y = y \sin 0 \Rightarrow$ هر کس می‌تواند جایگزین x (2)

مثال نقض

تابع نیست ✓

ب) $\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = 2 \xrightarrow{x=y}$ $\frac{x}{y} + \frac{y}{x} = 2 \Rightarrow \frac{\sqrt{x}}{\sqrt{y}} + \frac{\sqrt{y}}{\sqrt{x}} = 2$ (2)

$$\frac{x}{y} + \frac{y}{x} = 2$$

$$\frac{x^2 + y^2}{xy} = 2 \Rightarrow x^2 + y^2 = 2xy$$

$$x^2 + y^2 - 2xy = 0$$

✓ $x=y$ تابع است ✓ $x=y$ می‌تواند صفر باشند

الف) $y = \sqrt{\frac{x-1}{x-3}} + \sqrt{\frac{1-x}{x}}$

$$x \neq 3, 0$$

$$\frac{1}{x-3} - \frac{1}{x}$$

$$\frac{1}{x-3} - \frac{1}{x}$$

✓ $|Df| = (0, 1)$

ب) $\sqrt{x} + \sqrt{y-1} = \sqrt{2}$

$$\sqrt{y-1} = \sqrt{2} - \sqrt{x}$$

$\sqrt{y-1} \geq 0 \Rightarrow \sqrt{2} - \sqrt{x} \geq 0$

$y-1 = 2 - 2\sqrt{x} + x$
 $y = 3 - 2\sqrt{x} + x$
 $Df = \begin{bmatrix} 1-1/\sqrt{x} \\ 1 \end{bmatrix}$

$$x \geq 1$$

$$x \geq 1$$

$$Df = \begin{bmatrix} 1-1/\sqrt{x} \\ 1 \end{bmatrix}$$

Date: / /

Subject:

$$x) \frac{\sqrt{x^2 - 4x + 4}}{\sqrt{x^2 - 4x + 4}} \Rightarrow 1 \quad \frac{-4x + 4}{-4x + 4}$$

$$-4x + 4 > 0 \\ x < \frac{1}{2}$$

$$\frac{1}{x} \quad \frac{4}{x}$$

$$(-\infty \quad 1) \quad \checkmark \quad (2)$$

$$y) \frac{\sqrt{x^2 - 4x + 4}}{\sqrt{x^2 - 4x + 4}} \Rightarrow 1 \quad \frac{-4x + 4}{-4x + 4}$$

$$\frac{1}{x} \quad \frac{4}{x}$$

$$(-\infty \quad 1) \cup (2 \quad y) \cup (x + \infty) \quad \checkmark$$

$$u) \frac{\sqrt{x^2 - 4x + 4}}{\sqrt{x^2 - 4x + 4}} \Rightarrow 1 \quad \frac{-4x + 4}{-4x + 4}$$

$$\frac{1}{x} \quad \frac{4}{x}$$

$$\checkmark (-\infty \quad 1) \cup \left[\frac{x}{y} \quad +\infty\right)$$

$$\frac{1}{x} \quad \frac{4}{x}$$

$$(-\infty \quad 1) \cup \left[\frac{x}{y} \quad +\infty\right)$$

$$y) \frac{\sqrt{x^2 - 4x + 4}}{\sqrt{x^2 - 4x + 4}} \Rightarrow 1 \quad \frac{-4x + 4}{-4x + 4}$$

$$(-\infty \quad 1) \cup \left(1 \quad \frac{x}{y}\right) \cup \left[\frac{x}{y} \quad +\infty\right) \quad \checkmark$$