

$$A = \{1, 2, 3\} \quad B = \{2, 3\}$$

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

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

$$B^c = \{(1, 2), (1, 3), (2, 2), (2, 3)\}$$

الف) $f(n) = \{(3, m^2), (2, 1), (m, 4), (3, m+2), (-2, m), (m, 4)\}$

$$m^2 = m+2 \rightarrow m^2 - m - 2 = 0 \rightarrow (m-2)(m+1) = 0 \rightarrow m=2 \rightarrow GG \rightarrow \{(2, 1), (2, 4)\}$$

$$m = -1 \rightarrow GG \rightarrow \{(2, 1), (2, 4)\}$$

ب) $g(n) = \{(3, m^2), (2, 1), (m, 4), (3, m+2), (-2, m), (-1, 3)\}$

$$m^2 = m+2 \rightarrow m^2 - m - 2 = 0 \rightarrow (m-2)(m+1) = 0 \rightarrow m=2 \rightarrow GG \rightarrow \{(2, 1), (2, 4)\}$$

$$m = -1 \rightarrow GG \rightarrow \{(-1, 3), (-1, 4)\} \rightarrow \text{مقرر}$$

$$f(n) = \begin{cases} n^2 - 1 & ; n \leq 1 \\ an + b & ; 1 \leq n \leq 2 \\ n^3 & ; n \geq 2 \end{cases}$$

$$\begin{cases} a = 1, b = -1 \\ a = 1, b = 1 \end{cases} \rightarrow \begin{cases} a - 1 = a + b \rightarrow a = -b \\ a + b = 1 \rightarrow a = 1, b = -1 \end{cases}$$

$$a \times b = (-1)(1) = -1$$

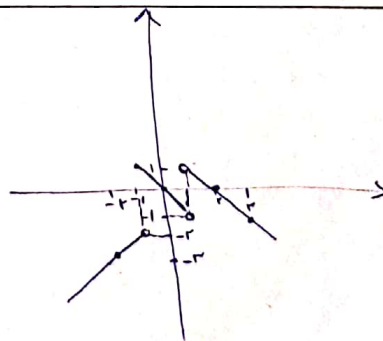
$$f(n) = \begin{cases} n^2 - 2 & ; n \geq k \\ f - n & ; n \leq k \end{cases}$$

$$\frac{f - n}{n = k} \rightarrow k^2 - 2 = f - k \rightarrow ak = v \rightarrow k = \frac{v}{a}$$

$$f(n) = \begin{cases} -n+2 & ; n > 1 \rightarrow \begin{vmatrix} 1 & 2 & 3 \\ 1 & 0 & -1 \end{vmatrix} \\ -n & ; -1 \leq n < 1 \rightarrow \begin{vmatrix} 1 & 0 & 1 \\ 1 & -1 & 0 \end{vmatrix} \\ n-1 & ; n < -1 \rightarrow \begin{vmatrix} 1 & -1 & -2 \\ 1 & -2 & -3 \end{vmatrix} \end{cases}$$

$$D_f = \mathbb{R} - \{1\}$$

$$R_f = (-\infty, 1]$$



الف) $x^2 + y^2 + 1 = 0 \rightarrow \begin{cases} x^2 = -1 - y^2 \\ y^2 = -1 - x^2 \end{cases} \xrightarrow{x=y} x^2 = -1 - x^2 \rightarrow x^2 = -\frac{1}{2} \rightarrow x = \pm \frac{1}{\sqrt{2}} \rightarrow y = \pm \frac{1}{\sqrt{2}}$

ب) $x^2 + y^2 - 12x + 16 = 0$
 $x^2 - 12x + 1 + y^2 - 12y + 9 = 0$

$(x-6)^2 + (y-6)^2 = 35$
 $\downarrow$
 $a=1$ $y = \frac{1}{x}$ $\rightarrow$ $\frac{1}{x} = \frac{1}{y}$ $\rightarrow$ $x=y$ $\rightarrow$ $x^2 + x^2 - 12x + 16 = 0$
 $2x^2 - 12x + 16 = 0 \rightarrow x^2 - 6x + 8 = 0 \rightarrow (x-2)(x-4) = 0 \rightarrow x=2, 4 \rightarrow y=2, 4$

الف) $x \sin y = y \sin x$
 $x=0 \rightarrow 0 \times \sin y = y \times 0 \rightarrow y=0$
 $y=0 \rightarrow x \times 0 = 0 \times \sin x \rightarrow x=0$

ب) $\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = 2$
 $\frac{x}{y} + \frac{y}{x} + 2 = 4 \rightarrow \frac{x^2 + y^2}{xy} = 2 \rightarrow x^2 + y^2 = 2xy \rightarrow x^2 - 2xy + y^2 = 0 \rightarrow (x-y)^2 = 0 \rightarrow x=y$

الف) $y = \sqrt{\frac{x-1}{x-2}} + \sqrt{\frac{x-2}{x-1}} \rightarrow \begin{cases} \frac{x-1}{x-2} \geq 0 \rightarrow x \in (-\infty, 1] \cup (2, +\infty) \\ \frac{x-2}{x-1} \geq 0 \rightarrow x \in (-\infty, 1] \cup (2, +\infty) \end{cases} \rightarrow D_y = (-\infty, 1] \cup (2, +\infty)$

ب) $\sqrt{x} + \sqrt{y-1} = \sqrt{3}$
 $\sqrt{y-1} = \sqrt{3} - \sqrt{x} \Rightarrow y-1 = 3 + x - 2\sqrt{3x} \Rightarrow y = x + 4 - 2\sqrt{3x} \rightarrow x \geq 0 \rightarrow y \geq 0$
 $D_y = [0, +\infty)$

الف) $y = \frac{\sqrt{x^2 - 4x + 4}}{\sqrt{x^2 - 10x + 4}} \rightarrow \begin{cases} x^2 - 4x + 4 \geq 0 \rightarrow x \in (-\infty, 1] \cup [4, +\infty) \\ x^2 - 10x + 4 \geq 0 \rightarrow x \in (-\infty, 2] \cup [5, +\infty) \end{cases} \rightarrow D_y = (-\infty, 1] \cup [4, +\infty)$

ب) $y = \sqrt{\frac{x^2 - 4x + 4}{x^2 - 10x + 4}} \rightarrow \frac{x^2 - 4x + 4}{x^2 - 10x + 4} \geq 0 \rightarrow \frac{(x-2)^2}{(x-5)^2} \geq 0 \rightarrow D_y = (-\infty, 1] \cup [4, +\infty)$

الف) $y = \sqrt{\frac{x^2 - 4x + 4}{x^2 - 10x + 4}} \rightarrow \begin{cases} x^2 - 4x + 4 \geq 0 \rightarrow x \in (-\infty, 1] \cup [4, +\infty) \\ x^2 - 10x + 4 \geq 0 \rightarrow x \in (-\infty, 2] \cup [5, +\infty) \end{cases} \rightarrow D_y = (-\infty, 1] \cup [4, +\infty)$