

$A = \{1, 2, 3\}$ $B = \{2, 3\}$ $A \cap B = \{(1, 2), (1, 3), (2, 2), (2, 3), (3, 2), (3, 3)\}$ $A \cap B - B^c = \{(1, 2), (1, 3)\}$ $B \cap B = \{(2, 1), (2, 2), (3, 2), (3, 3)\}$	1
الف) $f(x) = \{(3, m^2), (2, 1), (2, m), (-2, m), (3, m+2), (m, 4)\}$ $m^2 = m+2 \Rightarrow m^2 - m - 2 = 0 \Rightarrow m = \begin{cases} 2 \\ -1 \end{cases}$ if $m=2$ $(2, 1) \neq (2, 4) \Rightarrow$ تابع نیست $\} m=2$ if $m=-1$ $(1, 4) \Rightarrow$ تابع ب) $g(x) = \{(3, m^2), (2, 1), (m, 4), (3, m+2), (-2, m), (-1, 3)\}$ $m^2 = m+2 \Rightarrow m = \begin{cases} 2 \\ -1 \end{cases}$ if $m=2$ $(2, 1) \neq (2, 4) \Rightarrow$ تابع نیست if $m=-1$ $(-1, 3) \neq (-1, 4) \Rightarrow$ تابع نیست	2
$f(n) = \begin{cases} n^2 - 1; & n \leq 1 \\ an + b; & 1 < n \leq 2 \\ n^3; & n > 2 \end{cases}$ $n=1 \Rightarrow 1-1=0 \Rightarrow a+b=0$ $n=2 \Rightarrow 1=2a+b$ $\begin{cases} a+b=0 \\ 2a+b=1 \end{cases} \Rightarrow a+b=0 \Rightarrow b=-a$ $2a-1=1 \Rightarrow 2a=2 \Rightarrow a=1 \Rightarrow b=-1$	3
$f(n) = \begin{cases} 2n-3; & n \geq k \\ 4-3n; & n \leq k \end{cases} \Rightarrow 2k-3 = 4-3k \Rightarrow 5k=7 \Rightarrow k = \frac{7}{5}$	4
$f(n) = \begin{cases} -n+2; & n > 1 \rightarrow \frac{1}{1} \cdot \frac{2}{-1} \\ -1 \leq n < 1 \\ n-1; & n < -1 \rightarrow \frac{-1}{-1} \cdot \frac{-2}{-1} \end{cases}$ $D_f = \mathbb{R} - \{1\}$ $R_f = (-\infty, 1]$	5
الف) $xy^3 + x^2 + 1 = 0 \Rightarrow xy = -x^2 - 1 \Rightarrow \begin{cases} xy_1^3 = -x_1^2 - 1 \\ xy_2^3 = -x_2^2 - 1 \end{cases} \Rightarrow xy_1^3 = xy_2^3 \Rightarrow y_1^3 = y_2^3 \Rightarrow y_1 = y_2$ تابع است ب) $x^2 + y^2 - 2x - 4y + 1 = 0$ $\Rightarrow (x-1)^2 + (y-2)^2 = 0 \Rightarrow (x-1)^2 = -(y-2)^2 \Rightarrow (x-1)^2 = 0 \Rightarrow x=1$ $xy = 3 \Rightarrow -m+1=3 \Rightarrow m = -2$ $\frac{1}{1} \cdot \frac{3}{1} = 3 \rightarrow$ تابع است	6
$\sin y = y \sin x \rightarrow$ if $x=0 \rightarrow \sin 0 = 0$ تابع است ب) $\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = 2 \xrightarrow{\text{مربع}} \frac{x}{y} + \frac{y}{x} + 2\sqrt{\frac{y}{x} \cdot \frac{x}{y}} = 4$ $\frac{x}{y} + \frac{y}{x} = 2 \Rightarrow \frac{x^2 + y^2}{xy} = 2 \Rightarrow x^2 + y^2 - 2xy = 0$ $x = y$ تابع است ✓	7

$$\text{الف) } y = \sqrt{\frac{n-1}{n-2}} + \sqrt{\frac{2-n}{n}}$$

$$\frac{2n}{n} \geq 0 \Rightarrow -\frac{1}{2} + \frac{1}{2} = 0$$

-1

$$\frac{n-1}{n-2} \geq 0 \Rightarrow \frac{1}{+} - \frac{1}{-} = +$$

$$\textcircled{1} (0, 1]$$

$$\textcircled{1} (-\infty, 1] \cup (2, +\infty) \cap \textcircled{2} \cap \textcircled{1} \Rightarrow (2, 1]$$

$$\text{ب) } \sqrt{n} + \sqrt{y-1} = \sqrt{2} \Rightarrow \sqrt{y-1} = \sqrt{2} - \sqrt{n} \Rightarrow y-1 = 2 + n - 2\sqrt{2n}$$

$$y = n + 1 - 2\sqrt{2n} \quad 2n \geq 0 \quad n \geq 0 \Rightarrow D_y = [0, +\infty)$$

$$\text{الف) } y = \frac{\sqrt{n^2 - 4n + 4}}{\sqrt{n-1} \cdot n + 1} \rightarrow (n/1)(n/9) \Rightarrow \frac{1}{+} - \frac{1}{-} = + \Rightarrow \textcircled{1} (-\infty, 1] \cup [9, +\infty)$$

$$\frac{1}{+} - \frac{1}{-} = + \Rightarrow (-\infty, 1/9) \textcircled{2}$$

$$\textcircled{1} \cap \textcircled{2} \Rightarrow (-\infty, 1]$$

$$\text{ب) } y = \sqrt{\frac{n^2 - 4n + 4}{n^2 - 10n + 19}} \Rightarrow \frac{n^2 - 4n + 4}{n^2 - 10n + 19} \geq 0$$

$$\rightarrow (n/4)(n/1)$$

$$\frac{n}{y} \mid \frac{1}{+} - \frac{1}{-} = \frac{1}{-} - \frac{1}{+} = - \Rightarrow D_y = (-\infty, 1] \cup (4, 9] \cup (19, +\infty)$$

$$\text{الف) } y = \sqrt{\frac{2n^2 - 5n + 2}{3n^2 - 4n + 1}} \rightarrow \frac{2}{+} - \frac{1}{-} = + \Rightarrow (-\infty, 1] \cup [2, +\infty) \textcircled{1}$$

$$\frac{1}{+} - \frac{1}{-} = + \Rightarrow (-\infty, 1) \cup [2, +\infty) \textcircled{2}$$

$$\textcircled{1} \cap \textcircled{2} \rightarrow D_y = (-\infty, 1) \cup [2, +\infty)$$

$$\text{ب) } y = \sqrt{\frac{2n^2 - 5n + 2}{3n^2 - 4n + 1}} \rightarrow \frac{2}{+} - \frac{1}{-} = + \Rightarrow (-\infty, 1) \cup [2, +\infty)$$

$$\frac{1}{+} - \frac{1}{-} = + \Rightarrow (-\infty, 1) \cup [2, +\infty)$$

$$D_y = (-\infty, 1) \cup (1, 2) \cup [2, +\infty)$$

المرتب