

|                                     |                                                                                                                                                                            |                                          |                                                           |   |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|-----------------------------------------------------------|---|
| الف) $f(x)+2$                       |                                                                                                                                                                            | ج) $f(x-1)$                              |                                                           | 1 |
| ب) $f(x)$                           |                                                                                                                                                                            | د) $-f(x)$                               |                                                           | 2 |
| الف) $x^2-5x+4 > 0$                 | $(x-1)(x-4) > 0$                                                                                                                                                           | $\frac{1}{+} \frac{4}{-} \frac{1}{+}$    | $(-\infty, 1) \cup (4, +\infty)$                          | 3 |
| ب) $x^2-4x+5 < 0$                   | $(x-1)(x-5) < 0$                                                                                                                                                           | $\frac{1}{+} \frac{5}{-} \frac{1}{+}$    | $(1, 5)$                                                  |   |
| ج) $x^2+4x+5 \geq 0$                | $(x+1)(x+5) \geq 0$                                                                                                                                                        | $\frac{-1}{+} \frac{-5}{-} \frac{-1}{+}$ | $(-\infty, -5] \cup [-1, +\infty)$                        |   |
| د) $x^2-4x+4 \leq 0$                | $(x-1)(x-4) \leq 0$                                                                                                                                                        | $\frac{1}{+} \frac{4}{-} \frac{1}{+}$    | $[1, 4]$                                                  | 4 |
| الف) $\frac{x^2-3x+2}{x-5} < 0$     | $\frac{(x-1)(x-2)}{x-5} < 0$                                                                                                                                               | $\frac{1}{-} \frac{2}{+} \frac{5}{-}$    | $(-\infty, 1) \cup (2, 5)$                                |   |
| ب) $\frac{x^2-1}{x^2-4x+5} \geq 0$  | $\frac{(x+1)(x-1)}{(x-1)(x-5)} \geq 0$                                                                                                                                     | $\frac{-1}{+} \frac{1}{-} \frac{5}{-}$   | $(-\infty, -1] \cup (5, +\infty)$                         |   |
| الف) $\sqrt{\frac{x^2-1}{x^2-x}}$   | $\frac{(x-1)(x^2+x+1)}{x(x+1)(x-1)}$                                                                                                                                       | $\frac{-1}{+} \frac{0}{-} \frac{1}{+}$   | $\Rightarrow (-\infty, -1) \cup (0, 1) \cup (1, +\infty)$ | 5 |
| ب) $\sqrt{\frac{x^2-14}{x^2-5x+4}}$ | $\frac{(x+2)(x-7)}{(x-1)(x-4)} \geq 0$                                                                                                                                     | $\frac{-2}{+} \frac{1}{-} \frac{7}{+}$   | $(-\infty, -2] \cup (1, 4) \cup (7, +\infty)$             |   |
| الف) $\sqrt{4-\sqrt{2-x}}$          | $2-x \geq 0 \Rightarrow x \leq 2$<br>$4-\sqrt{2-x} \geq 0 \Rightarrow \sqrt{2-x} \leq 4 \Rightarrow 2-x \leq 16 \Rightarrow x \geq -14$<br>$\rightarrow -14 \leq x \leq 2$ | $[2, 11]$                                |                                                           |   |
| ب) $\sqrt{3-\sqrt{x-2}}$            | $x-2 \geq 0 \Rightarrow x \geq 2$<br>$3-\sqrt{x-2} \geq 0 \Rightarrow \sqrt{x-2} \leq 3 \Rightarrow x-2 \leq 9 \Rightarrow x \leq 11$<br>$\rightarrow 2 \leq x \leq 11$    | $[2, 11]$                                |                                                           |   |

|                                             |                                     |                                                                                                 |                                                                                                                                                                         |    |
|---------------------------------------------|-------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| الف) $\sqrt{4-x^2}$                         | $4-x^2 \geq 0$                      | $x^2 \leq 4$ $x \leq 2$ $-\sqrt{4} \leq x \leq \sqrt{4}$                                        | $\hookrightarrow [-2, 2]$                                                                                                                                               | 6  |
| ب) $\sqrt{3 x -9}$                          | $3 x  \geq 9$                       | $ x  \geq 3$                                                                                    | $\begin{matrix} x \geq 3 \\ x \leq -3 \end{matrix}$ $(-\infty, -3] \cup [3, +\infty)$                                                                                   | 7  |
| الف) $\sqrt{\frac{ x +1}{ x -3}}$           | $ x  \neq 3$                        | $x \neq 3$<br>$x \neq -3$                                                                       | $D_f = \mathbb{R} - \{-3, 3\}$                                                                                                                                          | 8  |
| ب) $\frac{\sqrt{x+1}}{\sqrt{x-3}}$          | $x \geq 0$<br>$\sqrt{x-3} \neq 0$   | $\sqrt{x} \neq 3$ $x \neq 9$                                                                    | $\Rightarrow [0, 9) \cup (9, +\infty)$                                                                                                                                  | 9  |
| الف) $\frac{\sin x}{\cos x - 1}$            | $\cos x - 1 \neq 0$ $\cos x \neq 1$ | $D_f = \mathbb{R} - \{2k\pi \pm \frac{\pi}{2}\}$                                                |                                                                                                                                                                         | 10 |
| ب) $\frac{\cos x + 1}{\sin x + 1}$          | $\sin x + 1 \neq 0$                 | $\sin x \neq -1$ $D_f = \mathbb{R} - \{k\pi + \frac{3\pi}{2}, k\pi + \frac{5\pi}{2}\}$          |                                                                                                                                                                         | 11 |
| ج) $\frac{\tan x + 2}{\cot x - 1}$          | $\cot x \neq 1$                     | $D_f = \mathbb{R} - \{k\pi + \frac{\pi}{4}\}$                                                   |                                                                                                                                                                         | 12 |
| د) $\frac{\sin x + 1}{\sin^2 x - 3}$        | $\sin^2 x - 3 \neq 0$               | $\sin x \neq \pm \sqrt{3}$ $D_f = \mathbb{R} - \{k\pi + \frac{\pi}{6}, k\pi + \frac{5\pi}{6}\}$ |                                                                                                                                                                         | 13 |
| $y = \frac{1}{\sqrt{2 x-2  - \frac{1}{2}}}$ | $2 x-2  - \frac{1}{2} > 0$          | $ x-2  > \frac{1}{4}$                                                                           | $\begin{matrix} x-2 > \frac{1}{4} & x > \frac{9}{4} \\ x-2 < -\frac{1}{4} & x < \frac{7}{4} \end{matrix}$<br>$D_f = (-\infty, \frac{7}{4}) \cup (\frac{9}{4}, +\infty)$ | 14 |
| الف) $y = \sqrt{4-2 x }$                    | $4-2 x  \geq 0$                     | $2 x  \leq 4$ $ x  \leq 2$ $-2 \leq x \leq 2$                                                   | $[-2, 2]$                                                                                                                                                               | 15 |
| ب) $y = \sqrt{\frac{ x }{ x }}$             | $\frac{ x }{ x } \geq 0$            | $x \neq 0$                                                                                      | $D_f = \mathbb{R} - \{0\}$<br>جواب این عبارت همیشه یک است پس باید مقدار صفر را علامت زد.                                                                                | 16 |