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$$x^2 - 3x + 2 > 0 \rightarrow (x-1)(x-2) > 0 \quad D_f = (-\infty, 1) \cup (2, +\infty)$$

$$x^2 - 4x + 5 < 0 \quad \Delta = 16 - 20 = -4 < 0 \quad \frac{c}{a} = 5 \quad D_f = (1, 5)$$

$$x^2 + 4x + 5 > 0 \rightarrow \Delta = 16 - 20 = -4 < 0 \quad \frac{c}{a} = 5 \quad D_f = (-\infty, -5] \cup [-1, +\infty)$$

$$x^2 - 7x + 4 < 0 \rightarrow \Delta = 49 - 16 = 33 > 0 \quad \frac{c}{a} = 4 \quad D_f = [1, 4]$$

$$\frac{(x-1)(x-2)}{x-5} < 0 \quad D_f = (-\infty, 1) \cup (2, 5)$$

$$\frac{x^2 - 1}{x^2 - 4x + 5} > 0 \rightarrow \frac{(x-1)(x+1)}{(x-2)^2 + 1} > 0 \quad D_f = (-\infty, -1] \cup (1, +\infty)$$

$$y = \sqrt{\frac{x^2 - 1}{x^2 - 4x + 5}} \Rightarrow \frac{x^2 - 1}{x^2 - 4x + 5} \geq 0 \quad D_f = (-\infty, -1) \cup (0, 1) \cup (1, 5)$$

$$y = \sqrt{\frac{x^2 - 14}{x^2 - 5x + 4}} \rightarrow \frac{x^2 - 14}{x^2 - 5x + 4} \geq 0 \quad D_f = (-\infty, -4) \cup (1, 4) \cup (5, +\infty)$$

$$y = \sqrt{4 - \sqrt{2 - x}} \rightarrow \begin{cases} 2 - x \geq 0 \rightarrow x \leq 2 \\ 4 - \sqrt{2 - x} \geq 0 \rightarrow \sqrt{2 - x} \leq 4 \rightarrow 2 - x \leq 16 \rightarrow x \geq -14 \end{cases} \quad D_f = [-14, 2]$$

$$y = \sqrt{x - \sqrt{x - 2}} \rightarrow \begin{cases} x - 2 \geq 0 \rightarrow x \geq 2 \\ x - \sqrt{x - 2} \geq 0 \rightarrow \sqrt{x - 2} \leq x \rightarrow x - 2 \leq x^2 \rightarrow x^2 - x + 2 \geq 0 \end{cases} \quad D_f = [2, +\infty)$$

$$y = \sqrt{5-2x^2} \Rightarrow 5-2x^2 \geq 0 \quad 2x^2 \leq 5 \quad x^2 \leq \frac{5}{2} \rightarrow |x| \leq \sqrt{\frac{5}{2}}$$

$$D_f = [-\sqrt{\frac{5}{2}}, \sqrt{\frac{5}{2}}]$$

6

$$y = \sqrt{|x|-9} \rightarrow |x|-9 \geq 0 \quad |x| \geq 9 \quad |x| \geq 9$$

$$D_f = (-\infty, -9] \cup [9, +\infty)$$

$$x \geq 9$$

$$x \leq -9$$

$$|x|-5 \neq 0 \quad |x| \neq 5 \quad |x| < 5 \quad |x| > 5 \quad D_f = \mathbb{R} - \{5, -5\}$$

7

$$\sqrt{x}-5 \neq 0 \quad \sqrt{x} \neq 5 \quad x \neq 25 \quad D_f = [0, +\infty) - \{25\}$$

$$x \geq 0$$

$$a) \cos x - 1 \neq 0 \quad \cos x \neq 1 \quad \cos x = 1 \quad x = 2k\pi \quad R - \{2k\pi, k \in \mathbb{Z}\}$$

$$b) \sin x + 1 \neq 0 \quad \sin x \neq -1 \quad \sin x = -1 \quad x = 2k\pi + \frac{3\pi}{2} \quad R - \{2k\pi + \frac{3\pi}{2}, k \in \mathbb{Z}\}$$

8

$$c) \lim_{x \rightarrow 0} \cos x \neq 0 \quad \frac{\cos x}{\sin x} \neq 0 \rightarrow R - \left\{ \frac{k\pi}{2} \right\} \cup \left\{ \frac{k\pi}{2} + \frac{\pi}{2} \right\}$$

$$d) \sin^2 x \neq 0 \rightarrow \sin x \neq 0 \rightarrow R - \{k\pi, k \in \mathbb{Z}\}$$

$$y = \frac{1}{\sqrt{|x|-1} - \frac{1}{2}} \quad \sqrt{|x|-1} - \frac{1}{2} > 0 \quad |x|-1 > \frac{1}{4} \quad |x| > \frac{5}{4}$$

$$D_f = (-\infty, -\frac{5}{4}) \cup (\frac{5}{4}, +\infty)$$

9

$$y = \frac{1}{\sqrt{|x|-1} - \frac{1}{2}} \quad |x|-1 > \frac{1}{4} \quad |x| > \frac{5}{4}$$

$$D_f = (-\infty, -\frac{5}{4}) \cup (\frac{5}{4}, +\infty)$$

$$y = \sqrt{5-2|x|} \rightarrow 5-2|x| \geq 0 \quad 2|x| \leq 5 \quad |x| \leq \frac{5}{2}$$

$$D_f = [-\frac{5}{2}, \frac{5}{2}]$$

10

$$y = \sqrt{\frac{|x|}{|x|}} \quad \frac{|x|}{|x|} \geq 0 \quad D_f = \mathbb{R} - \{0\}$$