

1) $2\cos x + 1 \neq 0 \Rightarrow 2\cos x \neq -1 \Rightarrow \cos x \neq -\frac{1}{2}$
 $\Rightarrow P_f = R - \left\{ 2k\pi + \frac{2\pi}{3}, 2k\pi + \frac{4\pi}{3} \right\}$

2) $\cos x - 1 \neq 0 \Rightarrow \cos x \neq 1 \Rightarrow P_f = R - \{2k\pi\}$

3) $\tan x + 1 \neq 0 \Rightarrow \tan x \neq -1 \Rightarrow P_f = R - \left\{ k\pi + \frac{3\pi}{4} \right\}$

4) $\cot x - 1 \neq 0 \Rightarrow \cot x \neq 1 \Rightarrow P_f = R - \left\{ k\pi + \frac{\pi}{4} \right\}$

5) $-1 \leq x^2 - 2 \leq 1 \Rightarrow 1 \leq x^2 \leq 3 \Rightarrow \begin{cases} 1 \leq x \leq \sqrt{3} \\ -1 \geq x \geq -\sqrt{3} \end{cases}$
 $\Rightarrow P_f = [-\sqrt{3}, -1] \cup [1, \sqrt{3}]$

6) $-1 \leq \sqrt{x} - 2 \leq 1 \Rightarrow 2 \leq \sqrt{x} \leq 3 \Rightarrow 4 \leq x \leq 9$
 $\Rightarrow P_f = [4, 9]$

7) $-1 \leq |x| - 2 \leq 1 \Rightarrow 2 \leq |x| \leq 3 \Rightarrow \begin{cases} -3 \geq x \geq -2 \\ 2 \leq x \leq 3 \end{cases}$
 $\Rightarrow P_f = [-3, -2] \cup [2, 3]$

8) $-1 \leq x^2 + 3x + 1 \leq 1 \Rightarrow \begin{cases} x^2 + 3x \leq 0 \Rightarrow -3, 0 \\ 0 \leq x^2 + 3x + 2 \Rightarrow -1, -\frac{2}{3} \end{cases}$
 $\Rightarrow [-3, 0] \cap \left\{ (-\infty, -1] \cup [-\frac{2}{3}, \infty) \right\} \Rightarrow P_f = [-3, -1] \cup [-\frac{2}{3}, 0]$

9) $x^2 - 4 > 0 \Rightarrow x^2 > 4 \Rightarrow x > 2 \text{ or } x < -2$
 $\Rightarrow P_f = (-\infty, -2) \cup (2, \infty)$

10) $2 - |x| > 0 \Rightarrow 2 > |x| \Rightarrow 2 > x \geq 0 \text{ or } 0 \leq x < -2 \Rightarrow P_f = (-2, 2)$

$$\text{a)} \left. \begin{aligned} d-x > 0 &\Rightarrow d > x \\ x-r > 0 &\Rightarrow x > r \\ x-r \neq 1 &\Rightarrow x \neq r \end{aligned} \right\} d > x > r, x \neq r \Rightarrow P_f = (r, d) - \{r\}$$

$$\text{b)} \left. \begin{aligned} x^2-1 > 0 &\Rightarrow x^2 > 1 \Rightarrow x > 1 \vee x < -1 \\ x+r > 0 &\Rightarrow x > -r \\ x+r \neq 1 &\Rightarrow x \neq -r \end{aligned} \right\} x > 1 \vee -1 > x > -r, x \neq -r \\ \Rightarrow P_f = (+\infty, 1) \cup (-r, -1) - \{r\}$$

$$\text{c)} \frac{x^2 - rx + r}{x-r} > 0 \xrightarrow{\text{عشر}} \begin{matrix} r, 1 \\ 1, r \end{matrix} \Rightarrow \begin{matrix} + & 1 & - & r & + \\ & 0 & & 0 & \end{matrix} \Rightarrow (-\infty, 1) \cup (r, +\infty)$$

$$x-r \neq 0 \Rightarrow x \neq r$$

$$\Rightarrow P_f = (-\infty, 1) \cup (r, +\infty)$$

$$\text{d)} \frac{x+r}{x-r} > 0 \xrightarrow{\text{عشر}} \begin{matrix} -r, r \end{matrix} \Rightarrow \begin{matrix} + & -r & - & r & + \\ & 0 & & 0 & \end{matrix} \Rightarrow (-\infty, -r) \cup (r, +\infty)$$

$$x-r \neq 0 \Rightarrow x \neq r$$

$$x+d > 0 \Rightarrow x > -d$$

$$x+d \neq 1 \Rightarrow x \neq -r$$

$$\Rightarrow P_f = (-d, -r) \cup (r, +\infty) - \{r\}$$

$$\text{e)} x-r > 0 \Rightarrow x > r$$

$$r - \log_r(x-r) \geq 0 \Rightarrow r \geq \log_r(x-r) \Rightarrow x-r \leq 1 \Rightarrow x \leq 1$$

$$\Rightarrow P_f = (r, 1]$$

$$\text{f)} x > 0$$

$$r \log_r x - 1 > 0 \Rightarrow r \log_r x > 1 \Rightarrow \log_r x > 1/d \Rightarrow x > \sqrt[r]{r}$$

$$\Rightarrow P_f = (\sqrt[r]{r}, +\infty)$$

$$1) f^x + 1 \neq 0 \Rightarrow f^x \neq -1 \Rightarrow x \neq \log_f^{-1} \cdot \frac{1}{f}$$

$$\Rightarrow D_f = \mathbb{R}$$

$$2) f^x - 1 \neq 0 \Rightarrow f^x \neq 1 \Rightarrow x \neq \log_f 1$$

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

$$3) f^x - \frac{1}{f} \neq 0 \Rightarrow f^x \neq \frac{1}{f} \Rightarrow x \neq \log_f \frac{1}{f} \Rightarrow x \neq \frac{1}{f}$$

$$\Rightarrow D_f = \mathbb{R} - \{\frac{1}{f}\}$$

$$4) f^x - f^r \neq 0 \Rightarrow f^x \neq f^r \Rightarrow x \neq \log_f f^r$$

$$\Rightarrow D_f = \mathbb{R} - \{\log_f f^r\}$$

$$5) f^{x+1} \in \mathbb{W} \Rightarrow f^x \in \mathbb{W} - 1 \Rightarrow x \in \frac{\mathbb{W} - 1}{f}$$

$$\Rightarrow D_f = \{x \mid x = \frac{k-1}{f}, k \in \mathbb{W}\}$$

$$6) \frac{f^x - f}{f^x - d} \in \mathbb{W} \Rightarrow f^x - f \in f^x \mathbb{W} - d\mathbb{W} \Rightarrow f^x - f^x \mathbb{W} \in f - d\mathbb{W} \Rightarrow x = \frac{f - d\mathbb{W}}{f - f^x}$$

$$\Rightarrow D_f = \{x \mid x = \frac{f - dk}{f - f^k}, k \in \mathbb{W}\}$$