

الف)  $2\cos x + 1 \neq 0 \rightarrow \cos x \neq -\frac{1}{2} \rightarrow D_f = R - \left\{ 2K\pi + \frac{2\pi}{3}, 2K\pi + \frac{4\pi}{3} \right\}$

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ب)  $\cos x - 1 \neq 0 \rightarrow \cos x \neq 1 \rightarrow D_f = R - \{ 2K\pi \}$

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الف)  $\tan x + 1 \neq 0 \rightarrow \tan x \neq -1$   
 $\cos x \neq 0$  }  $D_f = R - \left\{ K\pi - \frac{\pi}{4} \right\}$

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ب)  $\cot x - 1 \neq 0 \rightarrow \cot x \neq 1$   
 $\sin x \neq 0$  }  $D_f = R - \left\{ K\pi + \frac{\pi}{4}, K\pi \right\}$

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الف)  $-1 < x^2 - 2 < 1 \rightarrow 1 < x^2 < 3 \rightarrow -\sqrt{3} < x < \sqrt{3}$  }  $D_f = [-\sqrt{3}, -1] \cup [1, \sqrt{3}]$

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ب)  $-1 < \sqrt{x} - 2 < 1 \rightarrow 2 < \sqrt{x} < 4 \rightarrow 4 < x < 16$  }  $D_f = [4, 14]$

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الف)  $-1 < |x| - 2 < 1 \rightarrow 2 < |x| < 4 \rightarrow -4 < x < -2$  }  $D_f = [-4, -2] \cup [2, 4]$

ب)  $-1 < x^2 + 2x + 1 < 1$    
 $\begin{cases} x^2 + 2x + 1 > -1 \rightarrow x^2 + 2x + 2 > 0 \rightarrow (x+1)(x+2) > 0 \\ x^2 + 2x + 1 < 1 \rightarrow x^2 + 2x < 0 \rightarrow x(x+2) < 0 \end{cases}$   
 $D_f = [-2, -1] \cup [-1, 0]$

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الف)  $x^2 - 4 > 0 \rightarrow x^2 > 4$    
 $\begin{cases} x > 2 \\ x < -2 \end{cases}$  }  $D_f = (-\infty, -2) \cup (2, +\infty)$

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ب)  $2 - |x| > 0 \rightarrow |x| < 2 \rightarrow -2 < x < 2$  }  $D_f = (-2, 2)$

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$$\begin{aligned} \text{الف) } & \left. \begin{aligned} a-x > 0 &\rightarrow x < a \\ x+r > 0 &\rightarrow x > -r \\ x-r \neq 1 &\rightarrow x \neq 1+r \end{aligned} \right\} D_f = (-r, a) - \{1+r\} \end{aligned}$$

$$\begin{aligned} \text{ب) } & \left. \begin{aligned} x^2-1 > 0 &\rightarrow x > 1 \text{ or } x < -1 \\ x+r > 0 &\rightarrow x > -r \\ x+r \neq 1 &\rightarrow x \neq -r \end{aligned} \right\} D_f = (-r-1) \cup (1+\infty) - \{-r\} \end{aligned}$$

$$\text{الف) } \frac{x^2 - rx + r}{x-r} > 0 \rightarrow \frac{(x-1)(x-r)}{x-r} > 0 \rightarrow \frac{1}{x} + \frac{r}{x-r} > 0 \quad D_f = (1, +\infty) - \{r\}$$

$$\begin{aligned} \text{ب) } & \left. \begin{aligned} \frac{x+r}{x-r} > 0 &\rightarrow \frac{-r-r}{x-r} > 0 \\ x+a > 0 &\rightarrow x > -a \\ x+a \neq 1 &\rightarrow x \neq -a \end{aligned} \right\} D_f = (-a, -r) \cup (r, +\infty) - \{-a\} \end{aligned}$$

$$\begin{aligned} \text{الف) } & r - \log_r(x-r) > 0 \rightarrow 1 \cdot \log_r(x-r) < r \rightarrow x-r < r^r \rightarrow x < r^r + r \\ & x-r > 0 \rightarrow x > r \end{aligned} \quad D_f = (r, r^r + r]$$

$$\begin{aligned} \text{ب) } & \left. \begin{aligned} x > 0 \\ r \log_r x - 1 > 0 &\rightarrow r \log_r x > 1 \rightarrow \log_r x > \frac{1}{r} \rightarrow x > r^{\frac{1}{r}} \end{aligned} \right\} D_f = (r^{\frac{1}{r}}, +\infty) \end{aligned}$$

$$\text{الف) } f^2 + 1 \neq 0 \rightarrow f^2 \neq -1 \rightarrow D_f = \mathbb{R}$$

$$\text{ب) } f^2 - 1 \neq 0 \rightarrow f^2 \neq 1 \rightarrow x \neq \pm 1 \rightarrow D_f = \mathbb{R} - \{\pm 1\}$$

$$\text{ج) } f^x - r \neq 0 \rightarrow f^x \neq r \rightarrow rx \neq 1 \rightarrow x \neq \frac{1}{r} \rightarrow D_f = \mathbb{R} - \left\{\frac{1}{r}\right\}$$

$$\text{د) } f^x - r \neq 0 \rightarrow f^x \neq r \rightarrow x \neq \log_r f \rightarrow D_f = \mathbb{R} - \left\{\log_r f\right\}$$

$$\text{الف) } rx + 1 \in W \rightarrow x \in \frac{W-1}{r} \rightarrow D_f = \left\{x \mid x = \frac{K-1}{r}, K \in W\right\}$$

$$\text{ب) } \frac{rx-r}{rx-a} \in W \rightarrow rx-r \in rxW - aW \rightarrow rx - rxW = -aW + r - x = \frac{r-aW}{r-rW}$$

$$D_f = \left\{x \mid x = \frac{aK-r}{rK-r}, K \in W\right\}$$