

الف) $\checkmark$ $\cot$ تعریف $\checkmark$ $\tan$ تعریف $\leftarrow$ شرط $\tan \neq -1$
 $\theta \neq k\pi$ $\theta \neq k\pi + \frac{\pi}{2}$
 $\theta \neq k\pi + \frac{\pi}{4}$ $\theta \neq k\pi - \frac{\pi}{4}$
 $\rightarrow D_f = \mathbb{R} - \left\{ k\pi, k\pi + \frac{\pi}{4}, k\pi - \frac{\pi}{4} \right\}$
 $\frac{k\pi}{4} \neq$

ب) $1 - \cos^2 \theta \geq 0$
 $\cos^2 \theta \leq 1$
 $\sin^2 \theta \leq \frac{1}{2}$
 $-\frac{1}{\sqrt{2}} \leq \sin \theta \leq \frac{1}{\sqrt{2}}$
 $D_f = \left[k\pi - \frac{\pi}{4}, k\pi + \frac{\pi}{4} \right]$

الف) $\cos \theta - 1 \geq 0 \rightarrow \cos \theta \geq 1 \rightarrow \theta \geq \frac{\pi}{2}$
 $D_f = \left[k\pi + \frac{\pi}{2}, 2k\pi + \frac{3\pi}{2} \right]$

ب) $1 - \cos \theta \geq 0 \rightarrow \cos \theta \leq 1 \rightarrow \theta \leq \frac{\pi}{2}$
 $D_f = \mathbb{R} - \left(k\pi - \frac{\pi}{2}, k\pi + \frac{\pi}{2} \right)$

الف) $\checkmark$ $\cos$ تعریف $\checkmark$ $\sin$ تعریف $\rightarrow$ $-1 \leq \sin \theta \leq 1$
 $\sin \theta \geq -1$ $\sin \theta \leq 1$
 $D_f = [-\frac{\pi}{2}, \frac{\pi}{2}] \cup [\frac{3\pi}{2}, \frac{5\pi}{2}]$

ب) $-1 \leq \cos \theta \leq 1 \rightarrow -1 \leq \sqrt{a - \sin^2 \theta} \leq 1$
 $a - \sin^2 \theta \geq 0 \rightarrow \sin^2 \theta \leq a \rightarrow \sin \theta \leq \sqrt{a}$ ①
 $a - \sin^2 \theta \leq 1 \rightarrow \sin^2 \theta \geq a - 1$
 $\sqrt{a-1} \leq \sin \theta \leq \sqrt{a}$ ②
 $D_f = [\sqrt{a-1}, \sqrt{a}]$

الف) $\log_{\frac{1}{3}} x > 0$
 $\log_{\frac{1}{3}} x < 1 \rightarrow x < 3$
 $D_f = (0, 3)$

ب) $\log_{\frac{1}{2}} x > 0$
 $\log_{\frac{1}{2}} x < 1 \rightarrow x > \frac{1}{2}$
 $D_f = \left(\frac{1}{2}, +\infty \right)$

الف) $x^{\frac{1}{2}} - 1 \geq 0 \rightarrow x^{\frac{1}{2}} \geq 1$
 $x^{\frac{1}{2}} \geq 1$
 $x^{\frac{1}{2}} - x + 3 \leq 0$
 $(x-1)(x-3) \leq 0$
 $D_f \in [1, 3]$

ب) $\checkmark$ $\cos$ تعریف $\checkmark$ $\sin$ تعریف $\rightarrow$ $k \in \mathbb{W} : \frac{\sin \theta + d}{\cos \theta + f} = k$
 $\sin \theta = \frac{-fk + d}{k - f}$
 $D_f = \left\{ \theta = \frac{-fk + d}{k - f} \mid k \in \mathbb{W} \right\}$