

الف) $\frac{x^4 - 4x}{x^3 - x} \geq 0 \rightarrow \frac{x(x-4)}{x(x-1)(x+1)} \geq 0$

-1	0*	1	4
-	+	+	-

 $D_f = (-1, 0) \cup (0, 1) \cup [4, \infty)$

ب) $\frac{x^6 - x^3}{x^3 - x} \geq 0 \rightarrow \frac{x^3(x-1)(x+1)}{x(x-1)(x+1)} \geq 0$

-1	0*	1*
+	+	+

 $D_f = \mathbb{R} - \{-1, 0, 1\}$

الف) $x + |x| > 0 \quad |x| > -x$

+
-
0

 $D_f = \mathbb{R}^+$

ب) $\sqrt{|x|} > 0$

+
-
0

 $D_f = \mathbb{R}^+$

الف) $2 - [x] \geq 0$
 $2 \geq [x] \quad (-\infty, 2) = D_f$

ب) $2 - [x] > 0$
 $2 > [x] \quad (-\infty, 2) = D_f$

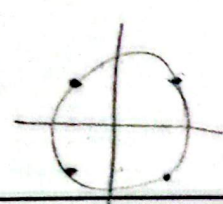
الف) $[x - \frac{1}{r}] + [x + \frac{r}{r}] \geq 0$
 $1 + [x - \frac{1}{r}] + [x + \frac{r}{r}] \geq 1$
 $[x + \frac{r}{r}] + [x + \frac{r}{r}] \geq 1$
 $x + \frac{r}{r} \geq 1 \quad 2[x + \frac{r}{r}] \geq 1$
 $x \geq \frac{1}{r} \quad [x + \frac{r}{r}] \geq \frac{1}{r}$
 $D_f = [\frac{1}{r}, \infty)$

ب) $[x - \frac{1}{r}] + [-x + \frac{1}{r}] \geq 0$
 $[x - \frac{1}{r}] + [-(x - \frac{1}{r})] \geq 0$
 $x - \frac{1}{r} \in \mathbb{Z} \quad x \in \mathbb{Z} + \frac{1}{r}$
 $x \in \mathbb{Z} \quad [x], [-x] \equiv 0$
 $x \notin \mathbb{Z} \quad [x] + [-x] = -1$

الف) $\sin x - 1 \neq 0$
 $\sin x \neq 1$

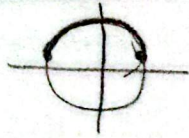

 $D_f = \mathbb{R} - \{2k\pi + \frac{\pi}{2}\}$

ب) $2 \sin^2 x - 1 \neq 0$
 $\sin^2 x \neq \frac{1}{2} \quad \sin x \neq \pm \frac{1}{\sqrt{2}} \quad \sin x \neq \pm \frac{\sqrt{2}}{2}$


 $D_f = \mathbb{R} - \{k\pi + \frac{\pi}{4}, k\pi + \frac{3\pi}{4}\}$

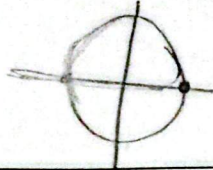
$\frac{1}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{\sqrt{2}}$

ا) $r \sin \alpha - 1 > 0$
 $\sin \alpha > \frac{1}{r}$



$D_f = \left[\left(k\pi + \frac{\pi}{4}, k\pi + \frac{3\pi}{4} \right) \right]$

ب) $\cos \alpha - 1 > 0$
 $\cos \alpha > 1$



$D_f = \{ \}$

ا) $-1 < |n| - r < 1$
 $r < |n| < r+1$
 $r < n < r+1$
 $-r < n < -r+1$

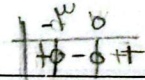
$D_f = [-r, -r] \cup [r, r]$

$D_f = [-r, -r] \cup [r, r]$

$[-r, 0] \xrightarrow{1} (-\infty, -r] \cup [r, \infty)$

ب) $-1 < n^2 + r n + 1 < 1$

$n^2 + r n + 1 < 1$
 $n^2 + r n < 0$
 $n(n+r) < 0$



$-1 < n^2 + r n + 1$
 $0 < n^2 + r n + r$
 $0 < n(n+r)$

ا) $r - \log_p(n-r) > 0$

$n-r > 0$
 $n > r$

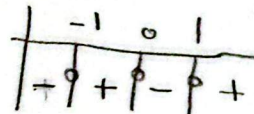
ب) $\log(n^2 - n)$

$r > \log_p(n-r)$

$n^2 - n > 0$

$n(n-1)(n+1) > 0$

$9 > n-r$ $r < n < 11$
 $11 > n$ $D_f = (r, 11]$



$D_f = (-1, 0) \cup (1, \infty)$

ا) $r^n + 1 \neq 0$
 $r^n \neq -1 \forall D_f = \mathbb{R}$

ج) $r^n - r \neq 0$
 $r^n \neq r$

ب) $r^n - 1 \neq 0$

$r^n \neq 1$

$n \neq 0$ $D_f = \mathbb{R} - \{0\}$

$\sqrt[r]{r} = r \rightarrow r^{\frac{1}{r}} = r$

$r^n \neq 1$
 $\log_r r^n \neq \log_r 1$
 $\log_r r^n \neq 0$

$D_f = \mathbb{R} - \left\{ \frac{1}{r} \right\}$

$D_f = \mathbb{R} - \{ \log_r r \}$

ا) $r n + 1 \in W$
 $r n \in W-1$
 $n \in \frac{W-1}{r}$

$D_f = \left\{ n \mid n = \frac{k-1}{r}, k \in W \right\}$

$D_f = \left\{ n \mid n = \frac{r-k}{r-n}, k \in W \right\}$

ب) $\frac{r n - r}{r n - r} \in W$

$r n - r \in r n W - r W$

$r n - r n W \in -r W + r$

$n \in \frac{r - r W}{r - r W}$