

$$\sin 30^\circ + \cos 110^\circ + \frac{1 \sin 135^\circ}{\cos 135^\circ} = \frac{1}{2} - 1 - \frac{\sqrt{2}}{\frac{\sqrt{2}}{2}} = -\frac{3}{2}$$

(الف)

$$-\cos 150^\circ + \sin 110^\circ - 3 \sin 135^\circ = \frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{2} - \frac{3\sqrt{3}}{2} = -\frac{\sqrt{3}}{2}$$

(ب)

$$\frac{\cos 110^\circ}{\sin 110^\circ} + \frac{1 \cos 135^\circ}{\sin 135^\circ} - \frac{1 \sin 150^\circ}{\cos 150^\circ} = -\frac{1}{\sqrt{3}} + \frac{3}{\sqrt{3}} + \frac{1}{\sqrt{3}} = \frac{3}{\sqrt{3}}$$

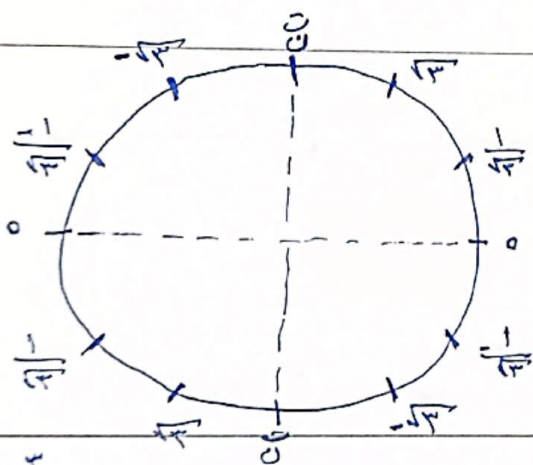
(ج)

$$\cos(\sin 110^\circ) + \sin(110^\circ \cos 135^\circ) = 1$$

(د)

if $a=1, x=1 \rightarrow 1+x = 2 \rightarrow 1+x \rightarrow f(1)=2$

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$x = -2 \rightarrow 11 - b = a - 4 \rightarrow 2x = a + b$

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$$x^2 - 4m^2 \neq 0 \rightarrow x^2(x-4) \neq 0 \rightarrow x \neq 0$$

(الف)

$$2m^2 + 4m^2 + 2m + 4 \neq 0 \rightarrow 2(m^2 + 2m^2 + m + 2) \quad (ب)$$

$$D_f = \mathbb{R} - \{0, 4\} = 2(m^2(m+2) + (m+2)) = 2(m+2)(m^2+1)$$

$$(m+2)(m^2+1) \neq 0 \rightarrow D_f = \mathbb{R} - \{4\}$$

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$x^2 - 1 \geq 0 \leadsto x^2 \geq 1 \leadsto x \geq 1 \vee x \leq -1$ ① $x^2 \geq 1$	(الف)	
$x - 2 \geq 0 \leadsto x \geq 2$ ② $4x - 3 \geq 0 \leadsto 4x \geq 3 \leadsto x \geq \frac{3}{4}$ ③	$4 - 3x \geq 0 \leadsto 4 \geq 3x \leadsto x \leq \frac{4}{3}$ ④ $\xrightarrow{① \wedge ④} D_f = \left[\frac{3}{4}, \frac{4}{3} \right]$	6
$x^3 - 13x^2 + 44x \geq 0 \leadsto x(x-4)(x-11) \geq 0$ $x^3 - x - 4 \geq 0 \leadsto (x-2)(x+2)$ (الف) $x^3 - 2x^2 - 8x + 4 = (x-1)(x-2)(x+2)$ (ب)	$D_f = [2, +\infty) \cup (-\infty, -2]$	7
$x^3 + 2x^2 - 8x - 4 = (x+1)(x+2)(x-2) \leadsto \frac{(x-1)(x-2)(x+2)}{(x+1)(x+2)(x-2)} \leadsto -2 < x < 2$ $D_f = (-\infty, -2) \cup (-2, 2) \cup [2, +\infty)$		
$b - 3x \geq 0 \Rightarrow x \leq \frac{b}{3}$ $4x - a \geq 0 \Rightarrow x \geq \frac{a}{4}$ $\left[\frac{a}{4}, \frac{b}{3} \right]$ $\frac{b}{3} = \frac{a}{4} \Rightarrow b = \frac{3a}{4} \leadsto 4b = 3a \leadsto 4b = a$		8
$x[x] - 4 \geq 0 \leadsto x[x] \geq 4 \leadsto [x] \geq 2 \leadsto D_f = (+\infty, 2]$ (الف) $x[x] - 8 \geq 0 \leadsto x[x] \geq 8 \leadsto [x] \geq 2 \leadsto x \geq 2 \leadsto D_f = (+\infty, 2]$ (ب)		9
$ x - 3 \geq 0 \leadsto x \neq 3$ ① / $4 - x \geq 0 \leadsto 4 \geq x$ ② $x + 1 \geq 0 \leadsto x \geq -1$ ③ / $x^2 + 2x + 5 \geq 0 \leadsto x \in \mathbb{R}$ ④ $D_f = [4, -1] - \{3\}$	(الف)	
$x - [x] \geq 0 \leadsto x \geq [x] \leadsto 3 \geq x$ ⑤ $\xrightarrow{① \wedge ⑤} D_f = \emptyset$	(ب)	10