

الف)  $y^3 = 2x^2 - 1 \rightarrow y_1^3 = 2x^2 - 1$   
 $y_2^3 = 2x^2 - 1 \rightarrow y_1^3 - y_2^3$  ✓

ب)  $y^3 + y = 3x^2 - 1$   
 $y_1^3 + y_1 = 3x^2 - 1$   
 $y_2^3 + y_2 = 3x^2 - 1 \rightarrow y_1^3 + y_1 = y_2^3 + y_2$  ✓

$(y_1^3 - y_2^3) + (y_1 - y_2) = 0$   
 $(y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2) + (y_1 - y_2) = 0$   
 $(y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2 + 1) = 0$   
 $y_1 = y_2$  ✓

ج)  $y = x^2 - 1$   
 $y_1 = x^2 - 1$   
 $y_2 = x^2 - 1 \rightarrow y_1 = y_2$  ✓

د)  $|y| + xy = x^2 + 1$  مثلثی  $x = 0 \rightarrow y = 1$  ✓

ه)  $y^3 + x^3 = 2x - 1 \rightarrow y^3 = 2x - 1 - x^3$   
 $y_1^3 = 2x - 1 - x^3$   
 $y_2^3 = 2x - 1 - x^3 \rightarrow y_1^3 = y_2^3 \rightarrow y_1 = y_2$  ✓

و)  $\sqrt{y} + \sqrt{x} = 2$   
 $\sqrt{y_1} = 2 - \sqrt{x}$   
 $\sqrt{y_2} = 2 - \sqrt{x} \rightarrow y_1 = y_2$  ✓

ز)  $\tan \frac{\pi}{4} = 1$   
 $\tan \rightarrow \frac{\sin}{\cos} \frac{\pi}{4} = \frac{1}{1} = 1$

ح)  $\cot \frac{\pi}{4} = 1$   
 $\cot \rightarrow \frac{\cos}{\sin} \frac{\pi}{4} = \frac{1}{1} = 1$

ط)  $\tan 180^\circ = 0$   
 $\tan \rightarrow \frac{\sin}{\cos} 180^\circ = \frac{0}{-1} = 0$

ث)  $\sin \alpha = \frac{1}{2}$   $\alpha = 30^\circ, 150^\circ$

ج)  $\cos \alpha = \frac{\sqrt{2}}{2}$   $\alpha = 45^\circ, 315^\circ$

د)  $\sin \alpha = \frac{\sqrt{3}}{2}$   $\alpha = 60^\circ, 120^\circ$

ه)  $\cos \alpha = -\frac{1}{2}$   $\alpha = 120^\circ, 240^\circ$

و)  $\tan \alpha = \frac{1}{\sqrt{3}}$   $\alpha = 30^\circ, 210^\circ$

ز)  $\cot \alpha = \sqrt{3}$   $\alpha = 30^\circ, 210^\circ$

ح)  $\sec \alpha = 2$   $\alpha = 60^\circ, 300^\circ$

ط)  $\csc \alpha = \frac{2}{\sqrt{3}}$   $\alpha = 60^\circ, 120^\circ$

ث)  $\sec \alpha = -2$   $\alpha = 120^\circ, 240^\circ$

ج)  $\csc \alpha = -\frac{2}{\sqrt{3}}$   $\alpha = 240^\circ, 300^\circ$

الف)  $y = (x-\psi)(x-\psi)(x-\kappa)$

$\downarrow$        $\downarrow$        $\downarrow$   
 $\psi$        $\psi$        $\kappa$

| x | $\psi$ | $\psi$ | $\kappa$ |
|---|--------|--------|----------|
|   | -      | +      | -        |
|   |        |        | +        |

$D_f = [\psi, \psi] \cup [\kappa, +\infty)$

ب)  $y = (x-\psi)(x-\psi)^2(x-\kappa)$

$\downarrow$        $\downarrow$        $\downarrow$   
 $\psi$        $\psi$        $\kappa$   
 $\rightarrow \psi$        $\rightarrow \psi$

| x | $\psi$ | $\psi$ | $\kappa$ |
|---|--------|--------|----------|
|   | +      | -      | -        |
|   |        |        | +        |

$D_f = (-\infty, \psi] \cup [\kappa, +\infty)$

الف)  $y = \frac{(x-\psi)(x-\kappa)}{x-\psi}$

$\rightarrow \psi$

| x | $\psi$ | $\kappa$ |
|---|--------|----------|
|   | -      | +        |
|   |        |          |

$D_f = [\kappa, \psi) \cup [\kappa, +\infty)$

ب)  $y = \frac{(x-\psi)(x-\kappa)}{(x-\psi)^2}$

$\rightarrow \psi$        $\rightarrow \kappa$

مساكن  $\psi$  و  $\kappa$

| x | $\psi$ | $\kappa$ |
|---|--------|----------|
|   | +      | -        |
|   |        |          |

$D_f = (-\infty, \psi] \cup [\kappa, +\infty)$

الف)  $y = \frac{x^2 - \psi x + \psi}{x - \psi} = \frac{(x-1)(x+\psi)}{x - \psi}$

$\rightarrow \psi$        $\rightarrow -\psi$

| x | $-\psi$ | 1 | $\psi$ |
|---|---------|---|--------|
|   | +       | - | -      |
|   |         |   | +      |

$D_f = (-\infty, \psi) \cup (\psi, +\infty)$

ب)  $y = \frac{x^2 - \psi x + \psi}{x^2 - \kappa x + \psi} = \frac{(x-\psi)(x-1)}{(x-\psi)(x-1)}$

$\psi$        $1$

| x | 1 | $\psi$ | $\psi$ |
|---|---|--------|--------|
|   | + | +      | -      |
|   |   |        | +      |

$D_f = (-\infty, 1) \cup (1, \psi] \cup (\psi, +\infty)$

الف)  $y = \frac{x^2 - x^2}{x^2 + x + \psi} = x^2(x^2 - 1) = 0$  /  $x = 0$        $x = \pm 1$

| x | -1 | 1 |
|---|----|---|
|   | +  | - |
|   |    | + |

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

ب)  $y = \frac{x^2 + \psi x + \kappa}{x^2 + \psi x + \psi}$

$x^2 + \psi x + \psi \neq 0$   
 $(x+1)(x+\psi) \neq 0$   
 $-1$        $-\psi$

| x | $-\psi$ | -1 |
|---|---------|----|
|   | -       | +  |
|   |         | +  |

$D_f = [-\psi, -1) \cup (-1, +\infty)$