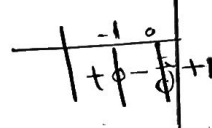


الف)  $y = (x-1)^3 + 1 \quad (x-1)^3 = y-1 \quad x = \sqrt[3]{y-1} + 1 \quad R = \mathbb{R}$

$\rightarrow \frac{1}{x^2-2x} = \frac{1}{y} \quad x^2-2x = \frac{1}{y} \quad x^2-2x-\frac{1}{y} = 0 \rightarrow \Delta = +$    
 $\Delta \geq 0 \quad 1 + \frac{1}{y} \geq 0 \quad \frac{y+1}{y} \geq 0$   
 $(-1)^3 - \varepsilon(1)(-\frac{1}{y}) = \varepsilon + \frac{\varepsilon}{y} = \varepsilon(1 + \frac{1}{y})$   
 $R = [-\infty, -1] \cup (0, +\infty)$

الف)  $x^2 \leq x + 10 \rightarrow \begin{cases} x_{\min} = \frac{-b}{2a} = \frac{-1}{2} = -\frac{1}{2} \text{ (2)} \\ y_{\min} = (-\frac{1}{2})^2 - \varepsilon(-\frac{1}{2}) + 10 = 9 \text{ (2)} \end{cases}$   $\rightarrow R = [9, +\infty)$   
 ب)  $\sqrt{x^2 - \varepsilon x - 3} \rightarrow \begin{cases} x_{\min} = \frac{-b}{2a} = \frac{\varepsilon}{2} = \frac{1}{2} \text{ (3)} \\ x_{\min} = -3 \end{cases}$   
 $\mathbb{R} = [-3, +\infty) \rightarrow [0, +\infty)$   
 ج)  $\sqrt{4x - x^2} \rightarrow \begin{cases} x_{\max} = \frac{-b}{2a} = \frac{2}{-1} = -2 \text{ (3)} \\ x_{\max} = -(\frac{1}{2})^2 + \varepsilon(\frac{1}{2}) + 3 = 12 \text{ (3)} \end{cases}$   
 $\rightarrow R = [-\infty, 4] \rightarrow R = [0, 4]$

الف)  $R = \mathbb{R}$

$\rightarrow R = \mathbb{R}$

ج)  $\sqrt{x^2 - \varepsilon x^2 + 10x + 1} \rightarrow R = \mathbb{R} \rightarrow R = [0, +\infty)$

$\rightarrow (x^2 - \varepsilon x^2 + 10x + 1)^2 \rightarrow R = (\mathbb{R})^2 \rightarrow R = [0, +\infty)$

الف)  $y = \frac{3x+1}{x-2} \rightarrow R = \{3\}$

$\rightarrow y = \frac{2x+1}{x+1} \rightarrow R = \{2\}$

الف)  $y = \sqrt{\frac{2x+5}{x+1}} = \sqrt{\mathbb{R} - \{5\}} \rightarrow [0, +\infty) - \{2\}$

$\rightarrow y = \sqrt{\frac{3x+1}{1-x}} = \sqrt{\mathbb{R} - \{-1\}} \rightarrow [0, +\infty)$

|                                                                                                                                                                                                                                                                                                                                                                         |                          |                |                |    |    |    |                |   |  |   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|----------------|----------------|----|----|----|----------------|---|--|---|
| <p>الف) <math>x+1=0 \Rightarrow x=-1</math><br/> <math>\frac{a}{c} = 2</math></p> <p>ج) <math>x+2=0 \Rightarrow x=-2</math><br/> <math>\frac{a}{c} = 2</math></p>                                                                                                                                                                                                       | <p>حساب و رسم نمودار</p> | ۶              |                |    |    |    |                |   |  |   |
| <p>الف) <math>R = (-\infty, -2] \cup [2, +\infty)</math></p> <p>ج) <math>x^3 + \frac{1}{x^3} \rightarrow R = (-\infty, -2] \cup [2, +\infty)</math></p> <p>ح) <math>\sqrt[3]{x} + \frac{1}{\sqrt[3]{x}} \rightarrow R = (-\infty, -2] \cup [2, +\infty)</math></p> <p>د) <math>\sqrt{x} + \frac{1}{x} \rightarrow R = [2, +\infty)</math></p>                           |                          | ۷              |                |    |    |    |                |   |  |   |
| <p>الف)</p> <p>ج) <math>\frac{x^2+1}{\sqrt{x^2+1}} = \sqrt{x^2+1} + \frac{1}{\sqrt{x^2+1}} \rightarrow R = [0, +\infty)</math></p> <p><math>\frac{1}{\sqrt{x^2+1}} \rightarrow \frac{1}{\infty} = 0</math></p>                                                                                                                                                          |                          | ۸              |                |    |    |    |                |   |  |   |
| <p> <math display="block">\begin{cases} x-3+3x+4 &amp; x &gt; 3 \\ -x+3+3x+4 &amp; -\frac{4}{3} \leq x \leq 3 \\ -x+3-3x-4 &amp; x &lt; -\frac{4}{3} \end{cases}</math> </p> <p> <table> <tr> <td>4</td> <td>3</td> <td><math>-\frac{4}{3}</math></td> <td>-2</td> </tr> <tr> <td>17</td> <td>13</td> <td><math>\frac{13}{3}</math></td> <td>7</td> </tr> </table> </p> | 4                        | 3              | $-\frac{4}{3}$ | -2 | 17 | 13 | $\frac{13}{3}$ | 7 |  | ۹ |
| 4                                                                                                                                                                                                                                                                                                                                                                       | 3                        | $-\frac{4}{3}$ | -2             |    |    |    |                |   |  |   |
| 17                                                                                                                                                                                                                                                                                                                                                                      | 13                       | $\frac{13}{3}$ | 7              |    |    |    |                |   |  |   |
| <p>الف) <math>x=2</math><br/> <math>x=-1</math></p> <p><math>R = [3, +\infty) \Rightarrow x=1</math><br/> <math>x=-1</math></p> <p><math>R = [-2, 2]</math></p>                                                                                                                                                                                                         |                          | ۱۰             |                |    |    |    |                |   |  |   |