

الف)  $6x^2 - 5x - 6 = 0 \rightarrow x^2 - 5x - 34 = 0 \rightarrow (x-9)(x+4) \rightarrow x_1 = 9, x_2 = -4$

ب)  $3x^2 - 8x - 3 = 0 \rightarrow x^2 - 8x - 9 = 0 \rightarrow (x+1)(x-9) \rightarrow x_1 = -1, x_2 = 9$

ج)  $4x^2 - 4x - 3 = 0 \rightarrow x^2 - 4x - 12 = 0 \rightarrow (x-4)(x+3) \rightarrow x_1 = 4, x_2 = -3$

د)  $2x^2 - 5x - 12 = 0 \rightarrow x^2 - 5x - 24 = 0 \rightarrow (x-8)(x+3) \rightarrow x_1 = 8, x_2 = -3$

1

الف)  $x^2 - 5x - 14 = 0 \rightarrow (x-7)(x+2) \rightarrow x_1 = 7, x_2 = -2$

ب)  $2x^2 + 5x + 3 = 0 \rightarrow \Delta = b^2 - 4ac \rightarrow 25 - 4(2)(3) \rightarrow \Delta = 1 \rightarrow \frac{-5 \pm 1}{4} \rightarrow x_1 = -1, x_2 = -\frac{3}{2}$

ج)  $x^2 + 2x + 3 = 0 \rightarrow \Delta = 4 - 4(1)(3) \rightarrow \Delta < 0$  ریشه ندارد.

د)  $3x^2 + 3x - 2 = 0 \rightarrow \Delta = 9 - 4(3)(-2) \rightarrow 9 + 24 = 33 \rightarrow \frac{-3 \pm \sqrt{33}}{6} \rightarrow x_1 = \frac{-3 + \sqrt{33}}{6}, x_2 = \frac{-3 - \sqrt{33}}{6}$

3

$A = \{1, 2, 3\} \quad B = \{2, 3\} \quad \{2, 3\}$

$A \times B = \{(1, 2), (1, 3), (2, 2), (2, 3), (3, 2), (3, 3)\}$

$B \times B = \{(2, 2), (2, 3), (3, 2), (3, 3)\}$

$A \times B - B \times B = \{(1, 2), (1, 3)\}$

الف)  $f(x) = \{(3, m^2), (2, 1), (-3, m), (-2, m), (3, m+2), (m, 4)\}$

ب)  $g(x) = \{(3, m^2), (2, 1), (m, 4), (3, m+2), (-2, m), (-1, 3)\}$

$m^2 = m+2 \rightarrow m^2 - m - 2 = 0 \rightarrow (m-2)(m+1) = 0 \rightarrow m = 2, m = -1$

بازی هیچ مقداری تابع نیست!

4

$f(x) = \{(1, a^2), (1, 3a-2), (a^2, 3a+2)\}$

$a^2 = 3a-2 \rightarrow a^2 - 3a + 2 = 0 \rightarrow (a-1)(a-2) = 0 \rightarrow a = 1, a = 2$

$a^2 = 3a+2 \rightarrow a^2 - 3a - 2 = 0 \rightarrow (a-4)(a+1) = 0 \rightarrow a = 4, a = -1$

$\{ (1, 1), (1, 1), (1, 5) \} \times$

$\{ (1, 4), (1, 4), (4, 1) \} \checkmark$

$a = 2$

5

|                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $f(x) = \begin{cases} x^2 - 1 & x \leq 1 \\ ax + b & 1 \leq x \leq 2 \\ x^3 & x \geq 2 \end{cases}$                                                                                                                                                                                                                                                                                                                                                  | $\left. \begin{aligned} x=1 &\rightarrow x^2-1 \rightarrow 1-1=0 \\ x=2 &\rightarrow ax+b \rightarrow a+b \\ x=2 &\rightarrow x^3 \rightarrow 8 \end{aligned} \right\} \rightarrow a+b=0 \xrightarrow{b^2-1} \boxed{a=1}$ $\left. \begin{aligned} x=2 &\rightarrow ax+b \rightarrow 2a+b \\ x=2 &\rightarrow x^3 \rightarrow 8 \end{aligned} \right\} \rightarrow 2a+b=8$ $x(2) \begin{cases} a+b=0 \\ 2a+b=8 \end{cases} \rightarrow \begin{cases} -a-2b=0 \\ 2a+b=8 \end{cases} \rightarrow \begin{cases} -b=8 \\ b=-8 \end{cases}$ $\boxed{a, b = -4, 4}$ |
| $f(x) = \begin{cases} 2x - 3 & x \geq k \\ 4 - 3x & x \leq k \end{cases}$                                                                                                                                                                                                                                                                                                                                                                            | $2k - 3 = 4 - 3k \rightarrow 5k = 7 \rightarrow \boxed{k = \frac{7}{5}}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <p>الف) <math>y^3 - 6y = x^2 - 4x + 3</math> ! تعجب</p> <p>ب) <math> x  +  y  = 3 \rightarrow x=0 \rightarrow  y =3 \rightarrow y=\pm 3</math> X تعجب</p> <p>ج) <math> y  = \sqrt{1 - \cos x} \rightarrow x=90^\circ \rightarrow \sqrt{1 - \cos 90^\circ} \rightarrow \sqrt{1 - 0} = 1 =  y  \rightarrow y = \pm 1</math> X تعجب</p> <p>د) <math>y^2 + x^2 + 2x + 1 = 0 \rightarrow y^2 + (x+1)^2 = 0 \rightarrow (-1, 0) \checkmark</math> تعجب</p> | <p>الف) <math>y^3 - 6y = x^2 - 4x + 3</math> X تعجب</p> <p>ب) <math> x  +  y  = 3 \rightarrow x=0 \rightarrow  y =3 \rightarrow y=\pm 3</math> X تعجب</p> <p>ج) <math> y  = \sqrt{1 - \cos x} \rightarrow x=90^\circ \rightarrow \sqrt{1 - \cos 90^\circ} \rightarrow \sqrt{1 - 0} = 1 =  y  \rightarrow y = \pm 1</math> X تعجب</p> <p>د) <math>y^2 + x^2 + 2x + 1 = 0 \rightarrow y^2 + (x+1)^2 = 0 \rightarrow (-1, 0) \checkmark</math> تعجب</p>                                                                                                         |
| <p>الف) <math>\sqrt[3]{y} + x^2 = 2x - 2</math></p> <p>ب) <math>y^3 + 2y = 5x</math></p> <p> <math>(y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2) = 2(x_1 - x_2)</math><br/> <math>(y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2) = -2(y_1 - y_2)</math><br/> <math>(y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2 + 2) = 0</math> </p>                                                                                                                                             | <p>الف) <math>\sqrt[3]{y} + x^2 = 2x - 2</math> تعجب</p> <p>ب) <math>y^3 + 2y = 5x</math> تعجب</p> <p> <math>(y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2) = 2(x_1 - x_2)</math><br/> <math>(y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2) = -2(y_1 - y_2)</math><br/> <math>(y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2 + 2) = 0</math> </p>                                                                                                                                                                                                                                           |
| <p>الف) <math>x \sin y = y \sin x \rightarrow x=0 \rightarrow \sin y=0 \rightarrow y=0</math></p> <p>ب) <math>\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = 2</math></p>                                                                                                                                                                                                                                                                                 | <p>الف) <math>x \sin y = y \sin x \rightarrow x=0 \rightarrow \sin y=0 \rightarrow y=0</math> تعجب</p> <p>ب) <math>\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = 2</math> تعجب</p> <p> <math>\sqrt{\frac{x}{y}} = a \rightarrow a + \frac{1}{a} = 2 \xrightarrow{\times a} a^2 + 1 = 2a \rightarrow a^2 - 2a + 1 = 0</math><br/> <math>(a-1)^2 = 0</math><br/> <math>\boxed{a=1}</math><br/> <math>\sqrt{\frac{x}{y}} = 1</math><br/> <math>x=y</math> </p>                                                                                                      |