

Q3

$$\frac{x+1}{3x+6} = \frac{3}{x} + \frac{2x+6}{3(3x+6)}$$

Annotations: In the first fraction, $3x+6$ is circled in yellow with arrows pointing to -2 and $+6$. In the second fraction, $3(3x+6)$ is circled in yellow with arrows pointing to -2 and $+6$, and a blue arrow points to the x in the denominator.

Find x (solve)

$$\frac{3}{3} \cdot \frac{(x+1)}{(3x+6)} \cdot \frac{x}{x} = \frac{3}{x} \cdot \frac{3(3x+6)}{3(3x+6)} + \frac{2x+6}{3(3x+6)} \cdot \frac{x}{x}$$

Annotations: The $\frac{3}{3}$ is written in green. The $\frac{3}{x}$ has the x circled in yellow. The fraction $\frac{3(3x+6)}{3(3x+6)}$ is circled in blue.

$$\frac{3x(x+1)}{3x(3x+6)} = \frac{9(3x+6)}{3x(3x+6)} + \frac{x(2x+6)}{3x(3x+6)} \rightarrow \text{LCD}$$

$$3x(x+1) = 9(3x+6) + x(2x+6)$$

Annotations: Blue arrows indicate the distribution of 3 to x and 1, and 9 to $3x$ and 6.

$$\frac{3x^2}{-2x^2} + 3x = 27x + 54 + \frac{2x^2}{-2x^2} + 6x$$

Annotations: The $\frac{3x^2}{-2x^2}$ is circled in green. The $27x$ and $6x$ are circled in pink. The $\frac{2x^2}{-2x^2}$ is crossed out with a green line.

$$x^2 + 3x = 33x + 54$$

Annotations: The $3x$ and $33x$ are circled in blue. Below the equation, $-33x$ is written twice, with a blue line crossing through the second one.

$$x^2 - 30x = 54$$

Annotations: Below the equation, -54 is written twice, with a blue line crossing through the second one.

$$x^2 - 30x - 54 = 0$$

Annotation: A yellow checkmark is next to the equation.

$$ab = -54$$

$$\boxed{x^2 - 30x - 54 = 0}$$

$$ab = -54$$

$$a+b = -30$$

$$(x+a)(x+b) = 0$$

$$\frac{27}{2}$$

check

3

$3 \rightarrow x$

$$x^2 - 10x - 24 = 0$$

$$(x+a)(x+b) = 0$$

$$(x-12)(x+2) = 0$$

$$ab = -24$$

$$a+b = -10$$

$$\frac{-12}{2}$$

$$x-12 = 0 \Rightarrow x = 12$$

or $x+2 = 0 \Rightarrow x = -2 \Rightarrow$ zero in denominator

check $x=12$
solution

$$\frac{x+1}{3x+6} = \frac{3}{x} + \frac{2x+6}{x(3x+6)}$$

$$\frac{13}{36+6} \stackrel{?}{=} \frac{3}{12} + \frac{24+6}{12(36+6)}$$

$$\frac{13}{42} \stackrel{??}{=} \frac{\frac{1}{3}}{\frac{1}{2}} + \frac{\frac{5}{30}}{\frac{1}{2}(42)}$$

$$\frac{13}{42} \stackrel{?}{=} \frac{1 \times 84}{4 \times 84} + \frac{5}{84} \times 4$$

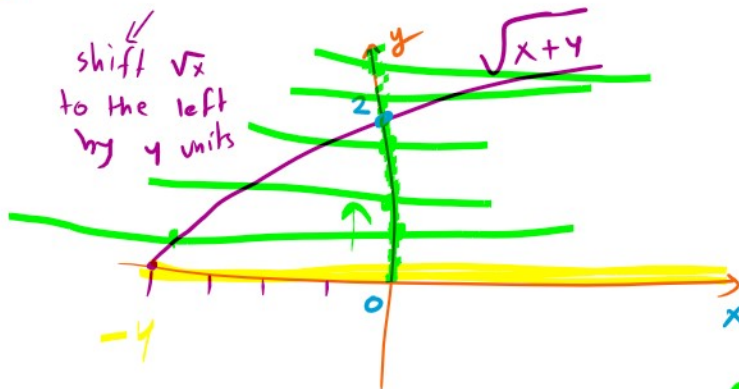
$$\stackrel{?}{=} \frac{84 + 20}{(4)(84)}$$

$$\stackrel{?}{=} \frac{\begin{array}{r} 13 \\ -52 \\ \hline 104 \end{array}}{\begin{array}{r} 4 \\ \times 84 \\ \hline 142 \end{array}}$$

$$\frac{13}{42} = \frac{13}{42}$$

29/1.2

$$y = \sqrt{x+4}$$



$$y(0) = \sqrt{0+4} = \sqrt{4} = 2$$

Find Domain + Rang

$$x+4 \geq 0$$

$$x \geq -4$$

$$D = [-4, \infty)$$

مِنَ x لا عَرَج
تَوَلَّى

$$R = [0, \infty)$$

مِنَ y الَّتِي لَا تَعْرِج
مِنَ x تَوَلَّى

المعادلة

$$ax^2 + bx + c = 0$$

a ✓

2nd level

$$ax^2 + bx + c = 0$$

a ✓
b ✓
c ✓

Exp solve this equation

$$D = b^2 - 4ac$$

$$\frac{1}{x} = \frac{3}{1} - \frac{5}{x-1}$$

$$\frac{x-1}{x-1} \cdot \frac{1}{x} = \frac{x(x-1)}{x(x-1)} \cdot \frac{3}{1} - \frac{5}{x-1} \cdot \frac{x}{x}$$

$$\left[\frac{(x-1)}{x(x-1)} = \frac{3x(x-1)}{x(x-1)} - \frac{5x}{x(x-1)} \right] \cdot \cancel{x(x-1)}$$

LCD : least Common Denominator

$$x-1 = 3x(x-1) - 5x$$

$$x-1 = 3x^2 - 3x - 5x$$

$$\cancel{x} - 1 = 3x^2 - 8x$$

$$\cancel{-1} = 3x^2 - 9x$$

$$3x^2 - 9x + 1 = 0$$

$$a = 3$$

✓

$$3x^2 - 9x + 1 = 0$$

$$a = 3$$

$$b = -9$$

$$c = 1$$

$$D = b^2 - 4ac$$

$$= (-9)^2 - 4(3)(1)$$

$$= 81 - 12$$

$$= 69 > 0 \Rightarrow \exists \text{ two real roots "different"}$$

$$\begin{array}{r} 781 \\ 12 \overline{) 69} \\ 69 \\ \hline \end{array}$$

$$x = \frac{-b \pm \sqrt{D}}{2a} = \frac{-(-9) \pm \sqrt{69}}{2(3)}$$

$$= \frac{9 \pm \sqrt{69}}{6}$$

$$x_1 = \frac{9 + \sqrt{69}}{6} \quad \checkmark$$

$$x_2 = \frac{9 - \sqrt{69}}{6} \quad \checkmark$$

Check

----- $x_1 \checkmark$
 $x_2 \checkmark$

Ex Find domain

①

$$y = \frac{\sqrt{x-1}}{x}$$

$x \geq 1$

Ex 1 Find domain (1) $y = \frac{x}{x-1}$

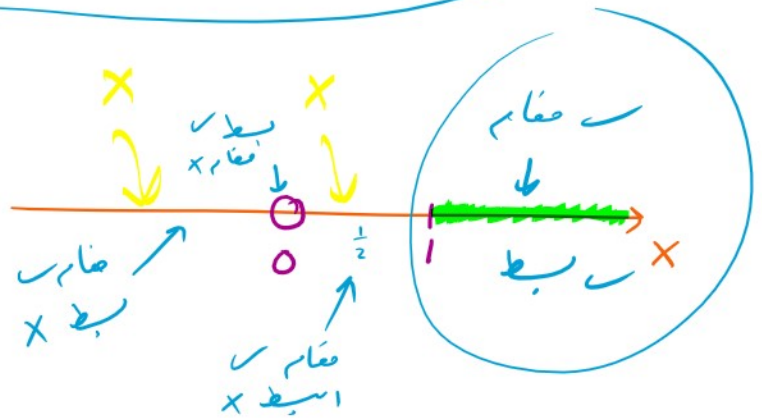
$$\frac{x-1}{+1} \geq 0$$

$x=0$ is a root

$\frac{0}{1} = 0$

$x \geq 1$

$D = [1, \infty)$



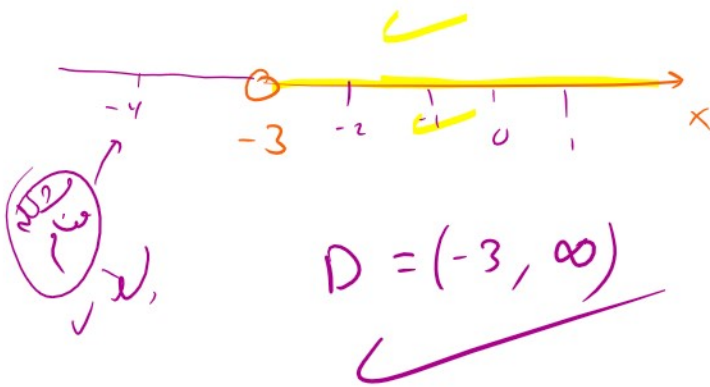
(2) $y = \frac{x}{\sqrt{2x+6}}$ any #

مجموعة حيز
مجموعة سالبة

$$\frac{2x+6}{-6} > 0$$

$$\frac{2x}{2} > \frac{-6}{2}$$

$x > -3$



$D = (-3, \infty)$

Q13
2.1

$$x^2 - 4x = 4$$

Q13
2.1

$$x^2 - 4x = 4$$

-4 +4

$$x^2 - 4x - 4 = 0$$

$$a = 1$$

$$b = -4$$

$$c = -4$$

$$D = b^2 - 4ac$$

$$= (-4)^2 - 4(1)(-4)$$

$$= 16 + 16$$

$$= 32 > 0 \Rightarrow \exists \text{ two real roots}$$

$$\sqrt{ab} = \sqrt{a}\sqrt{b}$$

$$x = \frac{-b \pm \sqrt{D}}{2a} = \frac{-(-4) \pm \sqrt{32}}{2(1)} = \frac{4 \pm \sqrt{4 \cdot 8}}{2}$$

$$= \frac{4 \pm \sqrt{4} \sqrt{8}}{2} = \frac{4 \pm 2 \sqrt{4 \cdot 2}}{2} = \frac{4 \pm 2 \sqrt{4} \sqrt{2}}{2}$$

$$= \frac{4 \pm 2 \cdot 2 \sqrt{2}}{2} = \frac{4 \pm 4 \sqrt{2}}{2} = \frac{4}{2} \pm \frac{4\sqrt{2}}{2}$$

$$= 2 \pm 2\sqrt{2}$$

$$x^2 - 4x = 4$$

check

$$x_1 = 2 + 2\sqrt{2}$$

$$x_2 = 2 - 2\sqrt{2}$$

check

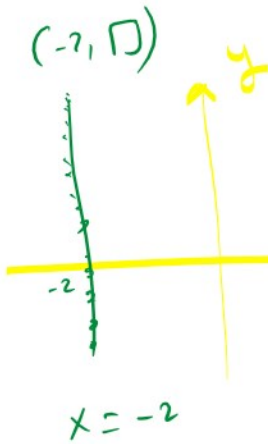
$$x_1 = 2 + 2\sqrt{2}$$

$$(2 + 2\sqrt{2})^2 - 4(2 + 2\sqrt{2}) \stackrel{?}{=} 4$$

$$(2)^2 + 2(2)(2\sqrt{2}) + (2\sqrt{2})^2 - 8 - 8\sqrt{2} \stackrel{?}{=} 4$$

$$4 + 8\sqrt{2} + 4 \cdot 2 - 8 - 8\sqrt{2} \stackrel{?}{=} 4$$

$$4 = 4$$



slope undefined

$$\hookrightarrow \frac{\Delta y}{\Delta x} = \frac{1 - 1}{-2 - -2} = \frac{0}{0}$$