Annalyn 9.3 Notes

Sunday, April 3, 2022 2:09 PM

9.3 Connecting Graphs and Rational Equations

To solve rational equations algebraically:

- Determine the value of all non-permissible values. List them.
- Find the least-common denominator (LCD).
- Multiply each term in the equation by the LCD, to eliminate fractions
- Solve this simpler equation. If a solution is an NPV, reject it.

Example

a) Solve algebraically: $\frac{3}{x}=1+\frac{x-13}{6}$

NPV $x=0$

LCD would be $6x$. Multiply each term in the equation by $6x$.

$$6x\left(\frac{3}{x}\right)=6x(1)+6x\left(\frac{x-13}{6}\right)$$

$$18=6x+x(x-13)$$

$$18=6x+x^2-13x$$

$$0=x^2-7x-18$$

$$0=(x+2)(x-9)$$

$x+2=0$ → $x=-2$

$x-9=0$ → $x=9$

(neither one is an NPV, so they are both valid solutions)

b) Verify the solution graphically.

There are two ways to solve graphically.

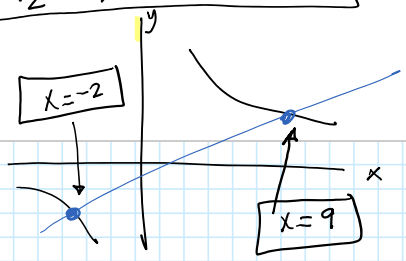
1) Graph Y_1 = LHS of equation
Graph Y_2 = RHS of equation.
Find the x-values where the 2 graphs intersect.
OR
2) Collect all terms of the original equation on one side of the equals sign.
Graph this equation.
Find all of this graph's x-intercepts (zeroes)

(SKIPPING THIS)

$$\frac{3}{x}=1+\frac{x-13}{6}$$

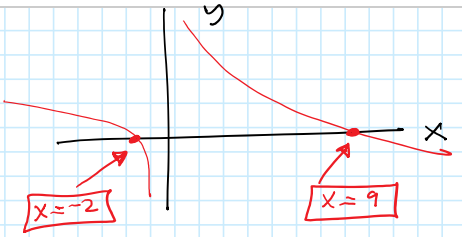
$Y_1 = 3/X$

$Y_2 = 1 + (X-13)/6$



$$\frac{3}{x}-1-\frac{(x-13)}{6}=0$$

$Y_1 = 3/X - 1 - (X-13)/6$



To try:

1a) Find the roots of this rational equation, algebraically: $x+\frac{6}{x+2}-5=0$

(b) Verify, graphically. (you could do, like we did on the previous page)

NPV $x=-2$

LCD $= x+2$

$(x+2)x + (x+2)\frac{6}{x+2} - (x+2)5 = 0$

$= 0$

$x^2+2x+6-5x-10$

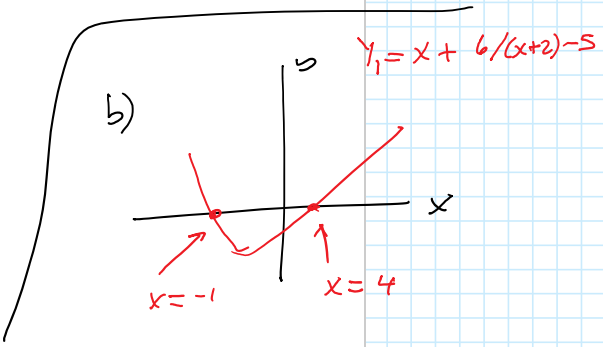
$x^2-3x-4 = 0$

$(x+1)(x-4) = 0$

$x+1=0$ → $x=-1$

$x-4=0$ → $x=4$

b)



2a) Find the roots of this rational equation, algebraically: $1+\frac{2}{x}=\frac{x}{x+3}$

b) Verify the solution graphically.

NPV $x=0$, $x+3=0$, $x=-3$

LCD $= x(x+3)$

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

$x(x+3) + 2(x+3) = x(x)$

$x^2+3x+2x+6 = x^2$

$-x^2 \quad -x^2$

$5x+6 = 0$

$\frac{5x}{5} = \frac{-6}{5}$

$x = \frac{-6}{5}$

how many he's earned

Example

Bert has scored 7/10 on each of five math quizzes so far this year. He really wants an "A" in his quiz bin. He is sure he can get 10/10 on every quiz for the rest of the semester. How many more quizzes does he need to write in order to get 86% in his quiz bin?

Right now, Bert's quiz percentage $= \frac{\text{Bert's quiz pts}}{\text{total quiz pts}} = \frac{35}{50} = 0.7$ or 70%

If x = number of additional quizzes written and Bert succeeds in getting 10/10 on each quiz, then

Bert's new quiz percentage = $\frac{\text{Bert's quiz total}}{\text{total quiz points total}}$

$$= \frac{35 + 10x}{50 + 10x}$$

$$\left(\frac{35 + 10x}{50 + 10x}\right) = (0.86)(50 + 10x)$$

multiply by $50+10x$, to get rid of the fraction

$50 + 10x = 0$

$\frac{10x}{10} = \frac{-50}{10}$

$x = -5$ NPV

$$35 + 10x = 43 + 8.6x$$

$-8.6x$ $-8.6x$

$$35 + 1.4x = 43$$

$$\frac{1.4x}{1.4} = \frac{8}{1.4}$$

$$x = 5.714\ldots$$

$\Rightarrow$ 6 more quizzes

Check: $\frac{35 + 10x}{50 + 10x}$

Substitute $x = 6$

$\frac{35 + 10(6)}{50 + 10(6)} = \frac{95}{110} = 0.8636$

$\doteq 86\%$

Rational Equations and Word Problems - group worksheet

9.3 TB p 465: 1, 2, 3-6(ac), 9, 11