

Class_23 June 13 - Rational Graphs and Equations

Tuesday, June 13, 2023 10:24 AM

Tonight's Class:

- (9.2) Rational Function Graphs - continued
- (9.3) Rational Equations

Teachers Please Have Students Complete

LEC Staff - please **take a couple of minutes in your classes Monday & Tuesday** to have students complete the 2 question form. The QR code is attached (you can project for them to use their phones) the link is also provided below.

Kim & I need to know how much food to purchase

[See more](#)



LEC Staff There are advertising posters going in your mailbox at the moment. Please display these in the rooms that you teach and discuss the BBQ with your students.

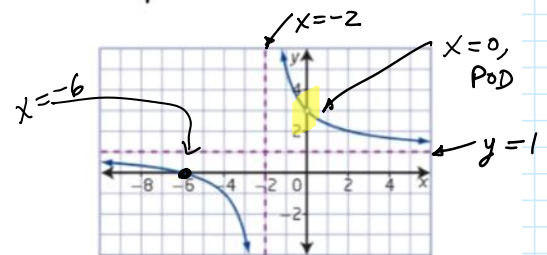
Notes package, page 11

Example (TB page 453, #7a)

Write the equation of the pictured rational function.

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

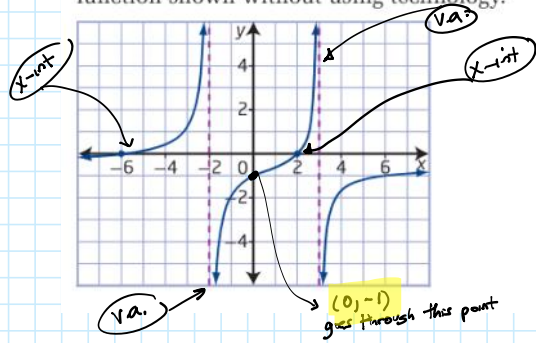
$$y = \frac{x^2 + 6x}{x^2 + 2x}$$



- i) x-intercept(s)
- 2) v.a.
- 3) PoD
- 4) h.a.

TB, page 454, #16

Determine the equation of the rational function shown without using technology.



$$y = \frac{a(x+6)(x-2)}{(x+2)(x-3)}$$

$$y = \frac{(0+6)(0-2)}{(0+2)(0-3)}$$

$$y = \frac{-12}{-6} = 2$$

$$(0, 2)$$

$$-1 = \frac{a(0+6)(0-2)}{(0+2)(0-3)}$$

$$-1 = \frac{-12a}{-6}$$

$$\frac{-1}{2} = \frac{2a}{1}$$

$$a = -\frac{1}{2}$$

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

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

WS - Graphing Rational Functions

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: $6x$

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

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

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

$$0 = x^2 + 6x - 13x - 18$$

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

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

$$x+2=0$$

$$x=-2$$

$$x-9=0$$

$$x=9$$

b) Verify the solution graphically.

SKIPPING THIS

There are two ways to solve graphically.

1) Graph $Y_1 = \text{LHS of equation}$

Graph $Y_2 = \text{RHS of equation.}$

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)

To try:

1a) Find the roots of this rational equation, algebraically:

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

NPV
 $x = -2$

b) Verify, graphically. **SKIPPING THIS**

LCD = $x+2$

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

$$x^2 + 2x + 6 - [5x + 10] = 0$$

$$x^2 + 2x + 6 - 5x - 10 = 0$$

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

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

$$\boxed{x = -1} \quad \rightarrow \quad \boxed{x = 4}$$

2a) Find the roots of this rational equation, algebraically:

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

NPVS

b) Verify the solution graphically.

$x = 0$

$x = -3$

LCD $x(x+3)$

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

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

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

$$\cancel{x^2} + 5x + 6 = \cancel{x^2}$$

$$5x + 6 = 0$$

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

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

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 = $\frac{\text{Bert's quiz pts}}{\text{total quiz pts}} = \frac{35}{50}$ $\rightarrow 86\%$
 $= 0.86$

If x = number of additional quizzes written, and Bert succeeds in getting $10/10$ on each quiz, then Bert's new quiz percentage = $\frac{35 + 10x}{50 + 10x}$ $= \frac{86}{100}$

NPV
 $x = -5$

LCD
 $10(5+x)$

$$\frac{35 + 10x}{50 + 10x} = 0.86$$

$$\cancel{10(5+x)} \left(\frac{35 + 10x}{\cancel{10(5+x)}} \right) = (0.86) (10)(5+x)$$

$$35 + 10x = 8.6(5+x)$$

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

$-8.6x$ $-8.6x$

$$35 + 1.4x = 43$$

-35 -35

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

$$x = 5.71 \dots$$

$$\Rightarrow \boxed{6 \text{ more quizzes}}$$

WS - Rational Equations and Word Problems

Coming up

- Thursday, June 15
 - Chapter 9 Hand-in due
- Tuesday, June 20
 - Test 7 (9.3, G.1-G.4)
 - Chapter G (10) Hand-in due
- Wednesday, June 21
 - Rewrite day (optional, can do up to 2 test rewrites)