Analysing Rational Functions

Lesson 6

Rational functions can have various different features. We have already seen:

Vertical Asymptote - corresponds to a non-permissible value in the equation of the rational function.

Horizontal Asymptote - corresponds to a value that the rational approaches as it moves away from the origin.

But, not all non-permissible values result in a vertical asymptote. Some non-permissibl values result in a point of discontinuity in the graph.

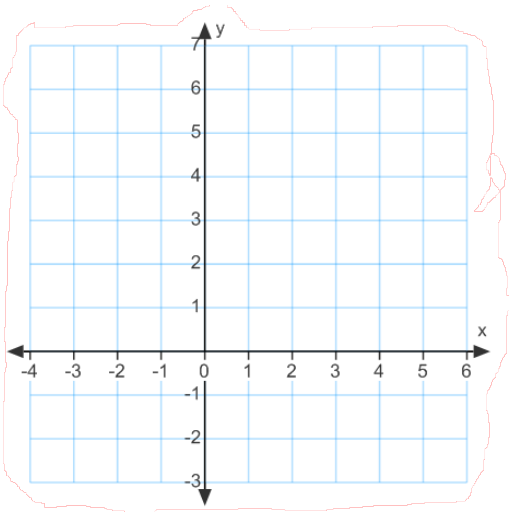
Investigation - Consider the function $y = \frac{x^2 - x - 2}{x - 2}$

What is the non-permissible value of this function?
Predict the graphs behavior as it approaches this x value.

Create a table of values using input values of -1, 0, 1, 2, 3, 4 and graph the function. Was your prediction correct?

x	y
-1	
0	
1	
2	
3	
4	

$$y = \frac{x^2 - x - 2}{x - 2}$$



Point of Discontinuity.

Point of Discontinuity - a point on the graph of a function that is not continuous.
- occurs when the function can be simplified by dividing out the common factor in the numerator and denominator.
- the missing 'single point' is represented by an open circle.
- considered a "hole in the graph"

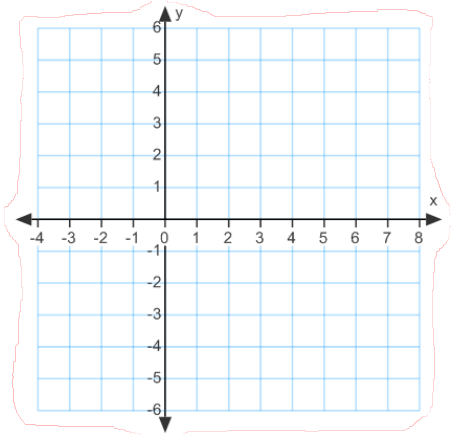
Example 1. Sketch the graph of the function $f(x) = \frac{x^2 - 5x + 6}{x - 3}$

Analyse its behavior near the non-permissible value.

State the non-permissible value, then simplify.

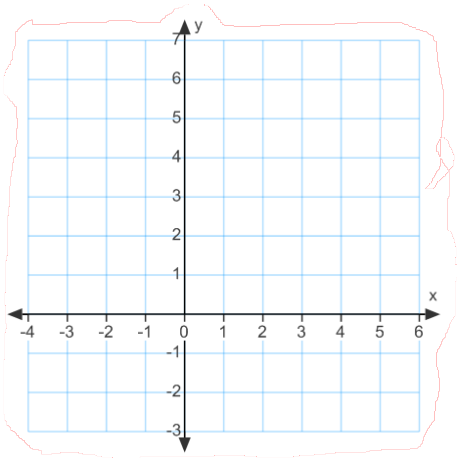
State the point of discontinuity.

Why does the function graph appear linear?



Your Turn: Sketch the graph of the function $f(x) = \dfrac{x^2 + 2x - 3}{x - 1}$

Analyse its behavior near the non-permissible value.



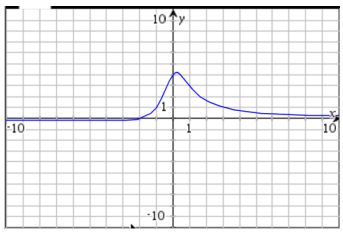
Example 2: Compare the behavior of the functions $f(x)=\frac{x^2-2x}{4-2x}$ and $g(x)=\frac{x^2+2x}{4-2x}$ near any non-permissible value.

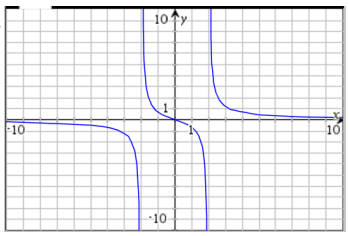
Your Turn: Compare the behavior of the functions $f(x)=\frac{x^2-3x}{2x+6}$ and $g(x)=\frac{x^2+3x}{2x+6}$ near any non-permissible value.

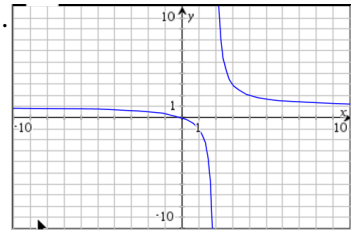
Example 3: Matching Graphs to the Equations of Rational Functions.

Match the equation of the rational function with its most appropriate graph. For each function, state any asymptotes, point of discontinuity and the x-intercept(s). Explain your reasons for each choice.

$$A(x) = \frac{x^2 + 2x}{x^2 - 4} \qquad B(x) = \frac{2x + 4}{x^2 + 1} \qquad C(x) = \frac{2x}{x^2 - 4}$$

1. 

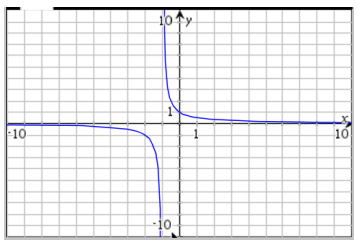
2. 

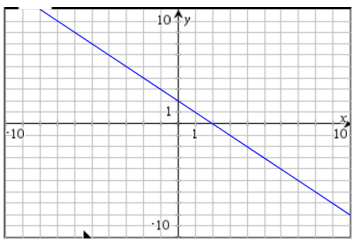
3. 

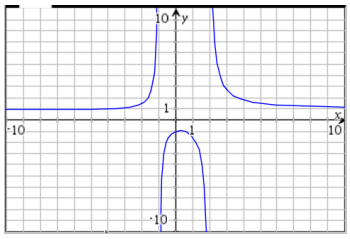
Your Turn:

Match the equation of the rational function with its most appropriate graph. For each function, state any asymptotes, point of discontinuity and the x-intercept(s). Explain your reasons for each choice.

$$A(x) = \frac{x^2 + 2}{x^2 - x - 2} \qquad B(x) = \frac{x - 1}{x^2 - 1} \qquad C(x) = \frac{x^2 - 5x + 6}{3 - x}$$

1. 

2. 

3. 

Homework

1. Assignment Handout:
   "BLM 9-3; Analysing Rational Functions - Extra Practice"

2. Text Pages 451 - 455, Exercises # 1 - 8, 10 - 12, 14, 15, 20

Attachments

Translations Assignment 1.doc