Quiz #3 - Extended Standards - Rationals

[redacted]

PreCalculus

Name Student 2

Date 3/3/23 Per. 4

Rubric for Scoring: Rational Functions

The following quiz has three sections each dedicated to the standards listed below. Each section will be scored separately using the following rubric:

Standard	Points: 3	2	1
A-APR.7: Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression.	Student shows full/acceptable mastery of this standard, justifying their answers fully and with evidence using proper mathematical language and symbols.	Student shows partial mastery of this standard by providing inconsistent or incorrect justification, or failing to use proper mathematical language and symbols.	Student shows little mastery of this standard, providing little to no justification for their answers or by leaving this answer blank.
F-IF.7d: Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, showing end behavior.	Student shows full/acceptable mastery of this standard, justifying their answers fully and with evidence using proper mathematical language and symbols.	Student shows partial mastery of this standard by providing inconsistent or incorrect justification, or failing to use proper mathematical language and symbols.	Student shows little mastery of this standard, providing little to no justification for their answers or by leaving this answer blank.
F-IF.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.	Student shows full/acceptable mastery of this standard, justifying their answers fully and with evidence using proper mathematical language and symbols.	Student shows partial mastery of this standard by providing inconsistent or incorrect justification, or failing to use proper mathematical language and symbols.	Student shows little mastery of this standard, providing little to no justification for their answers or by leaving this answer blank.

Nice job Student 2 It looks like you have a good conceptual understanding of rational functions. You need to work on identifying behaviors of the graph (specifically you had vertical asymptotes and x-intercepts switched). You didn't get the correct end behavior, but don't worry – I'll cover that more in class, keep it up!

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PreCalculus

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1) Determine if the equation $f(x) = x^2 - 1$ is a polynomial or a rational function. State your answer.

Polynomial function ✓

2) Determine if the equation $g(x) = \dfrac{(x^2-1)x}{x}$ is a polynomial or a rational function. State your answer.

Rational function ✓

3) Provide a justification for your answers above using the mathematical definitions for polynomial and rational functions. Compare and contrast $f(x)$ and $g(x)$, describing their graphical properties and what makes them similar and different.

Rational functions are a ratio between polynomial functions. g(x) is rational because it is the ratio between $(x^2-1)x$ and x, which combine in a function g(x). f(x) is just a polynomial function as it is not in ratio to another polynomial function, an example is with $a(x) = \dfrac{b(x)}{c(x)}$ where b(x) and c(x) are two polynomial functions within a(x) rational. Rational functions contain asymptotes when $c(x) = 0$. zeroes can be found when $b(x) = 0$.

Score: 3

Standard: A-APR.7: Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression.

Nice!

#3 - Extended Standards - Rationals

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4) Sketch a rough graph of the function $h(x) = \dfrac{x}{(x-2)(x+4)}$ by performing the following:

Score: 2

Standard: F-IF.7d: Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, showing end behavior.

a. Find the zeros (x-intercepts).

Asymptotes? Zeros at $x = 2$ and $x = -4$

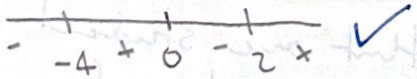
b. Find the vertical asymptotes.

~~Vertical asymptote~~ x-intercept at $x = 0$

c. Find the holes in the graph (if any).

none

d. Find the intervals where $h(x)$ is positive and where $h(x)$ is negative.



✓

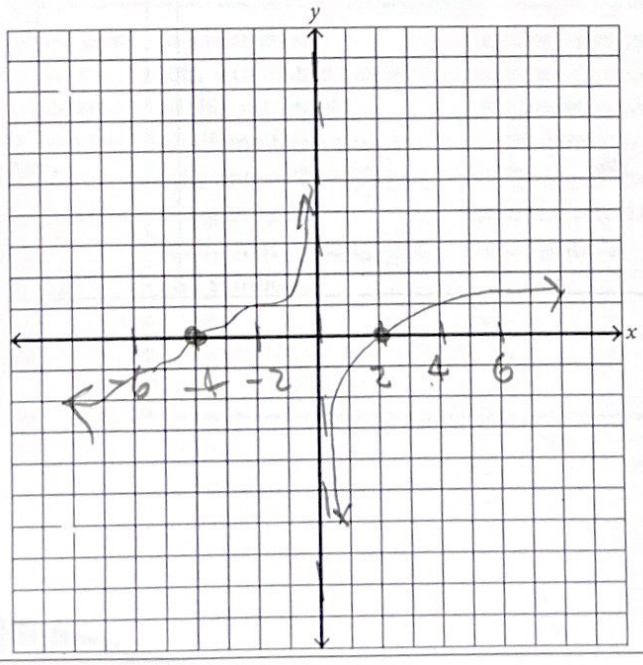
e. Determine the end behavior.

As $x \to \infty$, $y \to$ ~~∞~~ 0

As $x \to -\infty$, $y \to$ ~~$-\infty$~~ 0

$y \approx \dfrac{x}{x^2}$ when $x = \infty$ and $x = -\infty$

f. Sketch a rough graph:



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3) Mr. (me is planning a field trip to local company, a local computing company that does a lot of real-world mathematics. The cost to rent a bus for the trip is $800, and company is charging $12 per student to cover meals and snacks. One student in your class, Margaret, knows someone who works at company and so will get her meals and snacks for free.

Write an equation for a rational function that can be used to model the costs of the field trip for each student, assuming the total costs for the trip are divided evenly between each student attending. Remember: Mr. me is currently planning this trip, so he does not know yet how many students will be attending. Margaret has confirmed she will be going.

$f(x) = \frac{800}{x-1} + 12$

This would mean that one student wouldn't need to pay the bus fee and all the other students would pay it. Is that fair?

Score: 2.5

Standard: F-IF.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.