

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.

Great job **Student 1** You had 2's across the board, which means you're getting there! You need to focus on understanding how division affects the behavior of rational functions (e.g. zeros and asymptotes) and the meaning of dividing one polynomial by the other. Keep trying! We'll keep working on this in class!

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

Rational Function ~~X~~

$f(x)$ is polynomial
 $a_n x^n + a_{n-1} x^{n-1} + \dots$

$g(x)$ is Rational because there's a "ratio" - there's a division of two polynomials

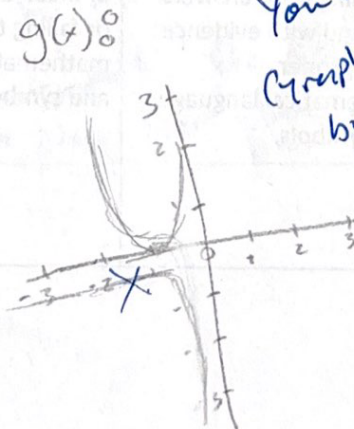
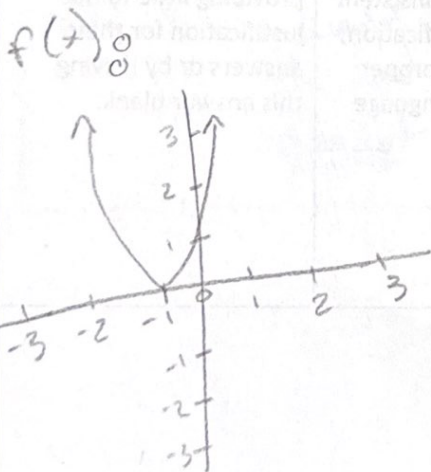
2) Determine if the equation $g(x) = \frac{(x^2 - 1)x}{x}$ is a polynomial or a rational function. State your answer.

Polynomial Function ~~X~~

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.

$g(x)$ = has Asymptotes, has breaks is divided

$f(x)$ = has zeros is squared able to subtract & add.



Good stuff here. You're definitely close. Graphs are the same but $g(x)$ has a hole at $x=0$

Score: 2

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.

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

a. Find the zeros (x-intercepts).

$x = 2$ $x = -4 \rightarrow$ Asymptotes!

b. Find the vertical asymptotes.

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

no holes ✓

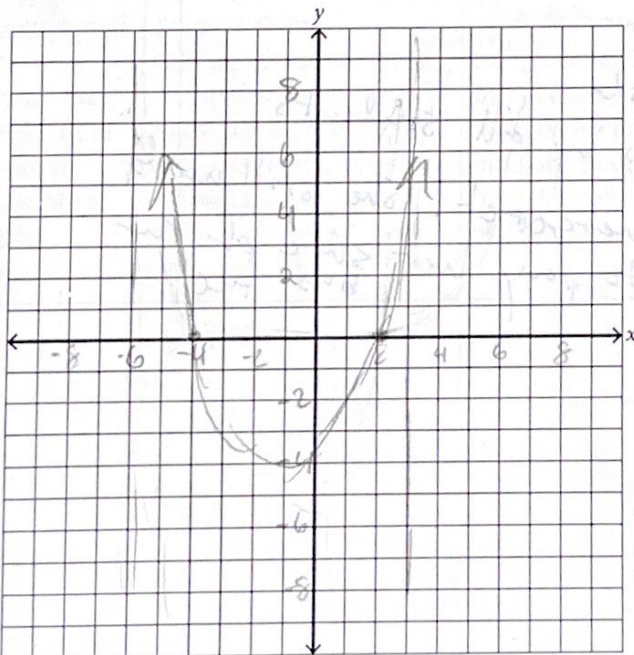
d. Find the intervals where $h(x)$ is positive and where $h(x)$ is negative.

Positive when greater than 2, negative when lower than 2.

e. Determine the end behavior.

Both negative & positive.

f. Sketch a rough graph:



Score: 2

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

Close. If you got the asymptotes and the zero correct, you likely would have had it.

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.

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.

Total cost: \$800
 cost per student: \$12
 # of students: ?

$$X = \frac{800}{x-1} + 12$$

Total cost

+ cost \$12

↓
 # of students going

Thus one for Margaret since she gets in for free

This would divide the cost up by all students except Margaret! She still needs to pay her share of the bus fee!