LG 16 Ver A

Name: _____ Student #:_____

Date:_____ T.A. #:_____

Mathematics 12 Pre-Calculus
LEARNING GUIDE 16 TEST – RATIONAL FUNCTIONS

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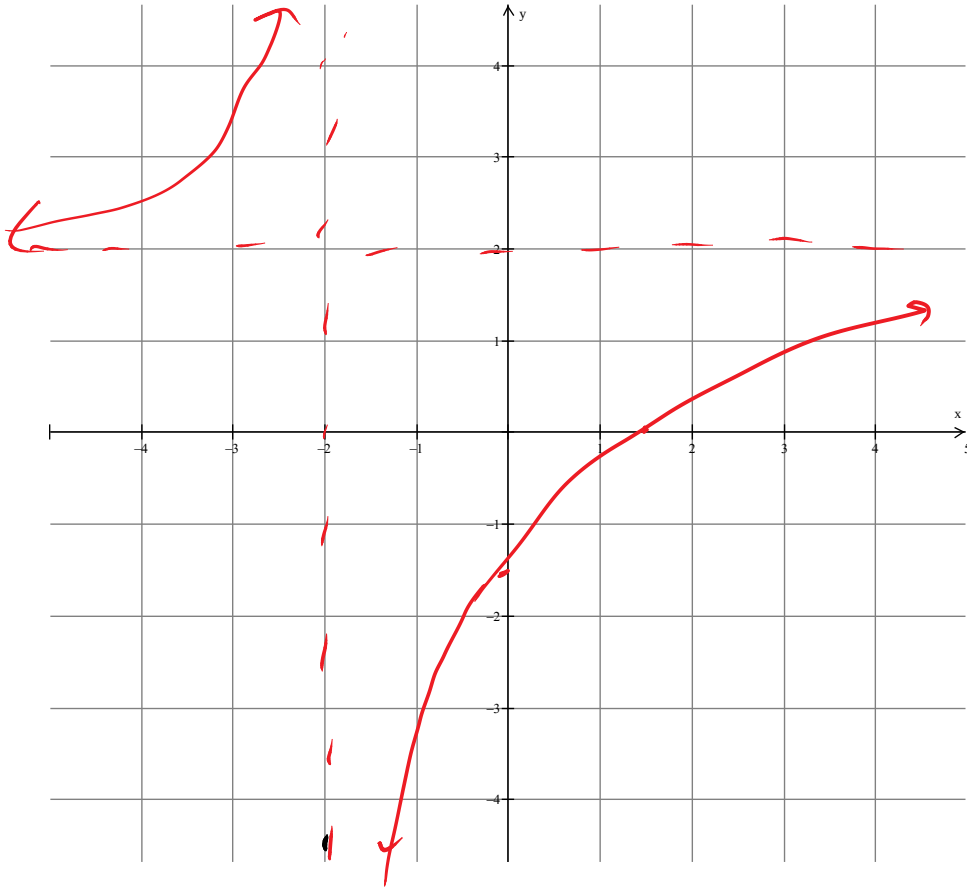
***Full marks will NOT be given for the final answer only.**

When using a calculator, you should provide a decimal answer that is correct **to at least two decimal places** (unless otherwise indicated). Such rounding should occur **only** in the final step of the solution.

1. Sketch the graph of $y = \frac{2x-3}{x+2}$ and determine the equations of any asymptotes and intercepts. (4 marks)



Asymptotes

$x = -2$

$y = 2$

x-int: 1.5

y-int: -1.5

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2. Create a rational function with asymptotes at x = 2 and y = -3. (2 marks)

$f(x) = \frac{-3x + c}{x - 2}$ ✓ constant ok.

3. For the function $f(x) = \frac{x+3}{x^2-x-12}$:

a) Determine the values of x where an asymptote occurs. (1 mark)

$(x^2 - x - 12) = 0$

$(x-4)(x+3)$

$x = 4$

b) Determine the values of x where a point of discontinuity exists. (1 mark)

$x = -3$

c) Determine the x and y intercepts of the function (2 marks)

x int: DNE

y int: $-\frac{1}{4}$

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4. Solve the following equation algebraically. (3 marks)

$$\frac{2}{x} = 3 - \frac{7x}{x-2}$$

$2(x-2) = 3x(x-2) - 7x(x)$

$2x - 4 = 3x^2 - 6x - 7x^2$

$4x^2 + 8x - 4 = 0$

$x^2 + 2x - 1 = 0$

$x = \frac{-2 \pm \sqrt{4 - 4(1)(-1)}}{2(1)}$

$x = \frac{-2 \pm \sqrt{8}}{2}$

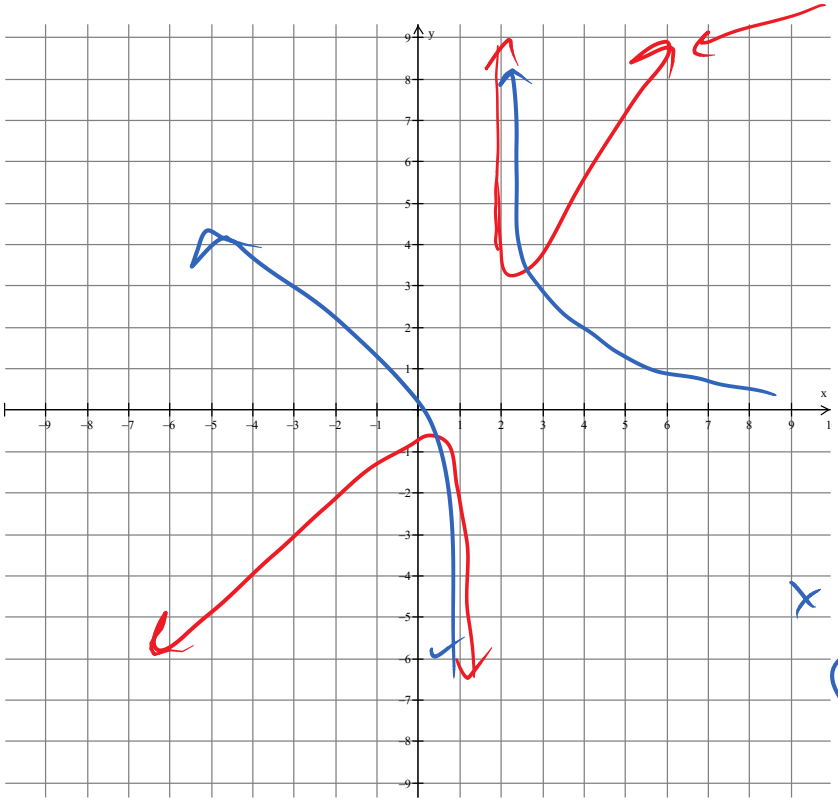
$= \frac{-2 \pm 2\sqrt{2}}{2}$

$= -1 \pm \sqrt{2}$

$(-2.41, 0.41)$

5. Solve the following equation graphically. (3 marks)

$$\frac{3}{5x-7} + x = 1 + \frac{x^2 - 4x}{7 - 5x}$$



$y_1 = \frac{3}{5x-7} + x$

$y_2 = 1 + \frac{x^2 - 4x}{7 - 5x}$

x INTERSECTION PT.

$x = 1, 1.67$

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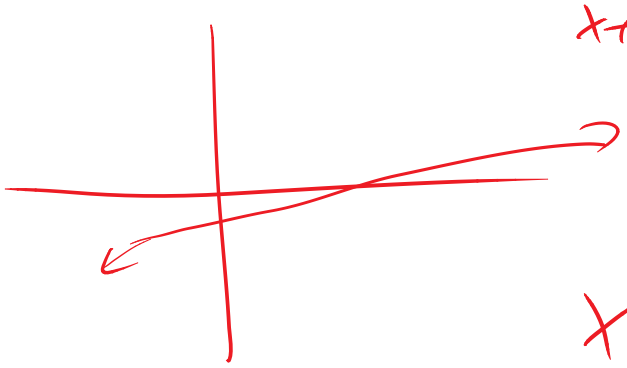
6. An airplane makes a 990-mi flight with a tail wind and returns, flying into the wind. The total flying time is 3 h 20 min, and the plane's airspeed is 600 mph. What is the wind speed in mph? (4 marks)

$v = \frac{d}{t}$ $\quad t = \frac{d}{v}$

$$\frac{990}{x+600} + \frac{990}{600-x} = 3\frac{1}{3}$$

GRAPH $\quad Y_1 = \frac{990}{x+600} + \frac{990}{600-x} - \frac{10}{3}$



FIND ROOT

$x = 60$

WIND: 60 km/h

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