

# MATH 118: Quiz 7

Name: \_\_\_\_\_

key

Directions:

- \* Show your thought process (commonly called "showing your work") when solving each problem for full credit.
- \* If you do not know how to solve a problem, try your best and/or explain in English what you would do.
- \* Good luck!

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1. Find all horizontal and vertical asymptotes for the rational function

$$r(x) = \frac{x^2 - 4x}{x^2 - 4x + 3}$$

Horizontal:

$$n = 2 = m \text{ so}$$

$$\boxed{y = \frac{a_n}{b_m} = \frac{1}{1} = 1}$$

Vertical:

$$\text{Solve } x^2 - 4x + 3 = 0.$$

$$\begin{array}{l} 1 \quad -3 \\ 1 \quad -1 \end{array}$$

$$(x - 3)(x - 1) = 0$$

$$x - 3 = 0 \quad x - 1 = 0$$

$$\boxed{x = 3}$$

$$\boxed{x = 1}$$

2. Consider the function  $f(x) = 81^x$ . Evaluate and fully simplify the following:

$$(a) f(0) = 81^0 = \boxed{1}$$

$$(c) f\left(\frac{1}{2}\right) = 81^{\frac{1}{2}} \\ = \sqrt{81} \\ = \boxed{9}$$

$$(b) f\left(\frac{1}{4}\right) = 81^{\frac{1}{4}} \\ = (3^4)^{\frac{1}{4}} \\ = 3^{4 \cdot \frac{1}{4}} \\ = \boxed{3}$$

$$\begin{array}{c} 81 \\ \swarrow \searrow \\ 9 \quad 9 \\ \swarrow \searrow \swarrow \searrow \\ 3 \quad 3 \quad 3 \quad 3 \end{array}$$

$$(d) f(1) = 81^1 = \boxed{81}$$

3. Evaluate the following logarithms:

$$(a) \log_6 6 = \boxed{1}$$

$$(c) \log 10^4 = \boxed{4}$$

$$(b) \log_3 \left(\frac{1}{3}\right) = \log_3 3^{-1} \\ = \boxed{-1}$$

$$(d) 3^{\log_3 7} = \boxed{7}$$