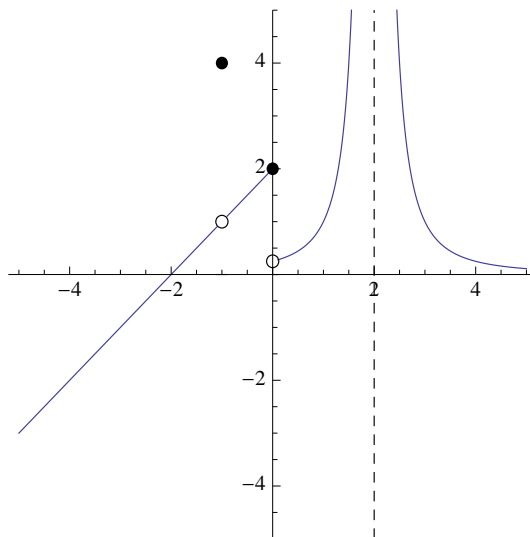Name:

Math 115 Exam 1

September 29

1) Consider the following portion of the graph of a function $y = f(x)$ from $x = -5$ to $x = 5$.

a) (2 points) Find all vertical asymptotes of f in the interval $-5 < x < 5$.

b) (3 points) List all values of a between -5 and 5 for which $\lim\limits_{x \to a} f(x)$ does NOT exist.

c) (5 points) Determine all values of a between -5 and 5 for which f is continuous at $x = a$.

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2) (15 points) Find all horizontal and vertical asymptotes for the function

$$f(x) = \frac{4x^2 - 36x - 88}{3x^2 + 108x + 204}.$$

3) Consider the function

$$f(x) = \begin{cases} \frac{3}{4}xm^2 + x^2m - 11 & x > 4 \\ 64 & x = 4 \\ \frac{x^2m}{4} + 52 & x < 4 \end{cases}$$

continuous at $x = 3$.

    a) (5 points) Find all values of m (if any exist) that make f continuous at $x = 5$.

    b) (15 points) Find all values of m (if any exist) that make f continuous at $x = 4$.

4) Evaluate the following limits.

a) (8 points) $\lim\limits_{x \to 19} \dfrac{x - 3}{x^2 - 361}$

b) (10 points) $\lim\limits_{x \to 12^+} \dfrac{|12 - x|}{-12 - 11x - 83x^2 + 7x^3}$

5) Evaluate yet more limits.

c) (5 points) $\lim\limits_{x \to 7^-} \left(\sqrt{7-x} + 2\cos\left(\dfrac{(x-7)^3}{x-10} \right) \right)$

d) (10 points) $\lim\limits_{x \to 7^-} \left(\sqrt{7-x} \cdot 2\cos\left(\dfrac{x-10}{(x-7)^3} \right) \right)$

e) (12 points) $\lim\limits_{x \to \infty} \left(\sqrt{25x^2 + 16x - 89} - 5x \right)$