VCU

# MATH 200

## CALCULUS I

R. Hammack

## TEST 1

February 6, 2015

Name: _____

Score: _____

**Directions.** Answer the questions in the space provided. Unless noted otherwise, you must show and explain your work to receive full credit. Put your final answer in a box when appropriate.

This is a closed-book, closed-notes test. Calculators, computers, etc., are not used.

**1.** (25 points) Warmup: quick answer.

(a) $(-8)^{\frac{1}{3}} =$

(b) State the domain of $f(x) = \dfrac{\sqrt{x+1}}{x^2-5}$.

(c) If $f(x) = x + \dfrac{1}{x}$ and $g(x) = \sqrt{x}$, then:

$f \circ g(x) =$

$g \circ f(x) =$

(d) $\cos\left(\frac{\pi}{3}\right) =$

(e) $\lim_{x \to \frac{\pi}{3}} (7 + 2\cos(x))^{\frac{2}{3}} =$

**2.** (10 points) Consider the equation $2\cos(x)\sin(x) = \sin(x)$.
Find all solutions $x$ of this equation for which $0 \leqslant x \leqslant 2\pi$.

**3.** (15 points) Evaluate the following limits.

(a) $\lim_{x \to 3} \dfrac{x^2 - 8x + 15}{x^2 - 2x - 3} =$

(b) $\lim_{x \to 0} \dfrac{\sin(\sqrt{9x})}{\sqrt{x}} =$

(c) $\lim_{x \to 2} \dfrac{\sqrt{x^2 + 12} - 4}{x - 2} =$

4. (15 points) Sketch the graph of any function that meets all of the following criteria.

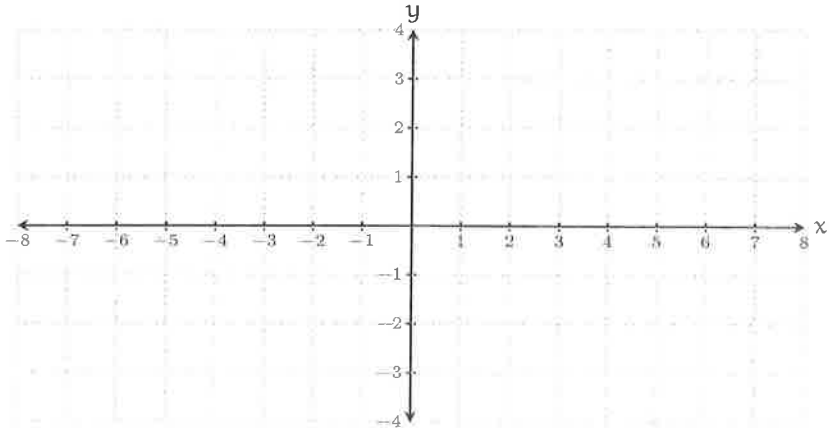
(a) $f(0) = 2$

(b) $f(x)$ is continuous at all real numbers except $x = 1$ and $x = 3$

(c) $\lim_{x \to 1^-} f(x) = \infty$ and $\lim_{x \to 1^+} f(x) = -\infty$

(d) $\lim_{x \to 3^-} f(x) = 3$ and $\lim_{x \to 3^+} f(x) = 2$

(e) $\lim_{x \to -\infty} f(x) = 3$ and $\lim_{x \to \infty} f(x) = 2$



5. (20 points) Evaluate the following limits.

(a) $\lim_{x \to 0} \left( \frac{\sin(x)}{x} + \frac{1}{x-1} \right) =$

(b) $\lim_{x \to 1^+} \left( \frac{\sin(x)}{x} + \frac{1}{x-1} \right) =$

(c) $\lim_{x \to \infty} \left( \frac{\sin(x)}{x} + \frac{1}{x-1} \right) =$

(d) $\lim_{x \to \pi} \left( \frac{\sin(x)}{x} + \frac{1}{x-1} \right) =$

6. (15 points) Two functions $f(x)$ and $g(x)$ are graphed below. Answer the following questions. (Short answer.)

(a) $f(3) =$

(b) $\lim_{x \to 2} g(x) =$

(c) $f\left(\lim_{x \to 2} g(x)\right) =$

(d) $\lim_{x \to 2} f(g(x)) =$

(e) $\lim_{x \to -3} \dfrac{f(x)}{g(x)} =$