VCU

MATH 200

CALCULUS I

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TEST 1

September 18, 2015

Name: _____

Score: _____

Directions. Answer the questions in the provided space. 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. Please put all phones away.

1. (20 points) Warmup: short answer.

(a) $4^{3/2} =$

(b) $\sin\left(\frac{7\pi}{3}\right) =$

(c) $\ln\left(\sqrt[5]{e}\right) =$

(d) $\ln\left(e^{x}\right) =$

(e) $e^{\ln(3)+\ln(5)} =$

(f) $\log_2(2) + \log_2\left(\frac{1}{8}\right) =$

(g) If $f(x) = \ln(x)$, then $f^{-1}(x) =$

(h) $\sin^{-1}(-1) =$

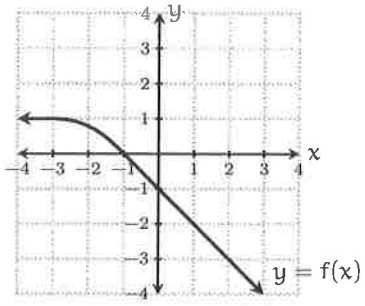
(i) $\sin\left(\sin^{-1}(0.3)\right) =$

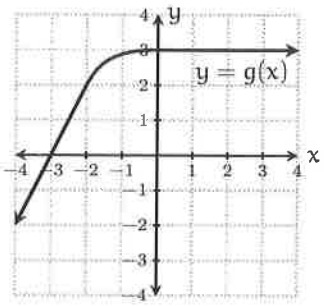
(j) $\lim_{x\to\infty} \tan^{-1}(x) =$

2. (10 points) For the functions $f(x)$ and $g(x)$ graphed below, find

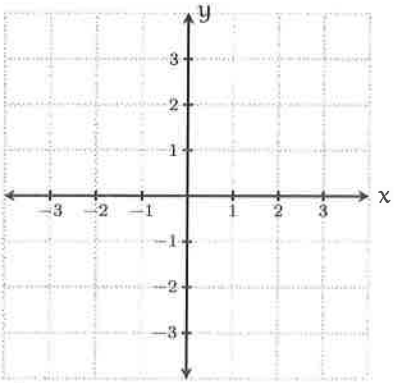
(a) $\lim_{x \to 1} f(x)g(x) =$

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





3. (5 points) Sketch the graph of $y = \tan^{-1}(x)$.



4. (20 points) Find the following limits.

(a) $\lim_{x \to 5} \frac{x-5}{x^2-25} =$

(b) $\lim_{x \to 2} \frac{\frac{1}{x} - \frac{1}{2}}{x-2}$

(c) $\lim_{h \to 0} \frac{\sqrt{16+h}-4}{h}$

(d) $\lim_{x \to 1} \ln\left(\frac{x^2-1}{2x-2}\right) =$

5. (15 points) Sketch the graph of a function that meets all of the following criteria.

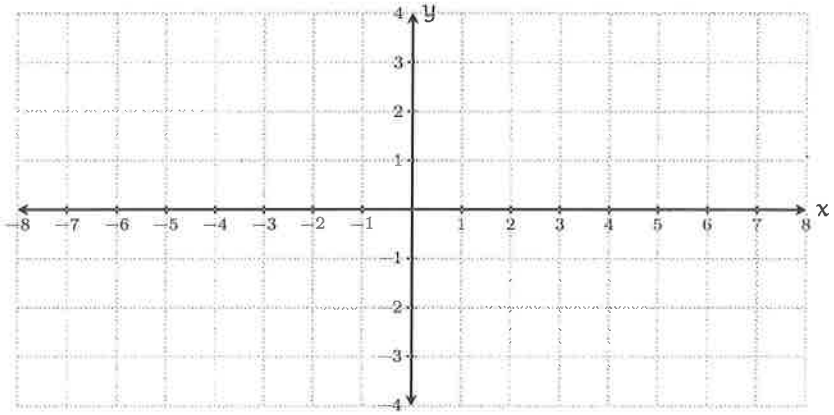
   (a) The domain of $f(x)$ is all real numbers except $x = -4$ and $x = 1$

   (b) $\lim_{x \to 1^+} f(x) = 3$, and $\lim_{x \to 1^-} f(x) = -1$

   (c) $f(x)$ is continuous at all real numbers except $x = -4$ and $x = 1$

   (d) $\lim_{x \to \infty} f(x) = 2$ and $\lim_{x \to -\infty} f(x) = 0$

   (e) The line $x = -4$ is a vertical asymptote



6. (5 points) Simplify: $\tan(\cos^{-1}(x)) =$

7. (5 points) Find the inverse of the function $f(x) = 2e^x - 1$.

8. (10 points) Find all solutions of the equation $\sin^2(x) = \sin(x)$.

9. (10 points) Find the horizontal and vertical asymptotes of the function $f(x) = \dfrac{2x^2 - 8}{x^2 + 3x + 2}$.