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) $8^{2/3} =$

(b) $\cos\left(\frac{7\pi}{6}\right) =$

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

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

(e) $e^{\ln(4)+\ln(5)} =$

(f) $3\ln(2) + \ln\left(\frac{1}{8}\right) =$

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

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

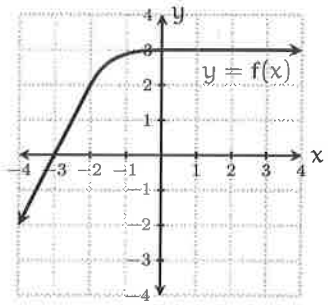
(i) $\sin\left(\sin^{-1}(0.5)\right) =$

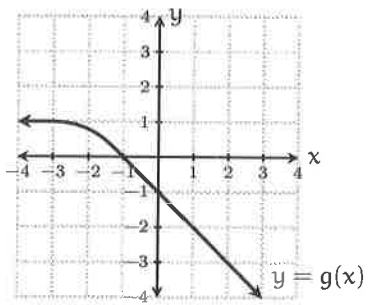
(j) $\lim_{x\to-\infty} e^x =$

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

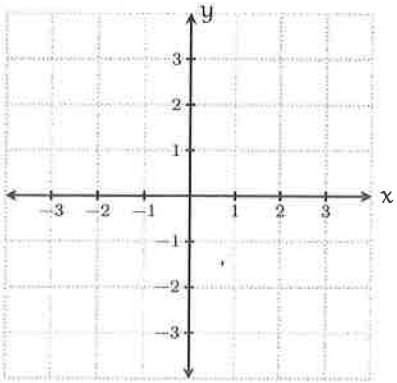
(a) $\lim_{x \to 1} f(x)g(x) =$

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





3. (5 points) Sketch the graphs of $y = e^x$ and $y = \ln(x)$.



4. (20 points) Find the following limits.

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

(b) $\lim_{x \to 9} \dfrac{\sqrt{x} - 3}{x - 9} =$

(c) $\lim_{h \to 0} \dfrac{\dfrac{1}{2+h} - \dfrac{1}{2}}{h}$

(d) $\lim_{x \to 0} \sin\left(\dfrac{\pi x + x^2}{4x}\right) =$

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

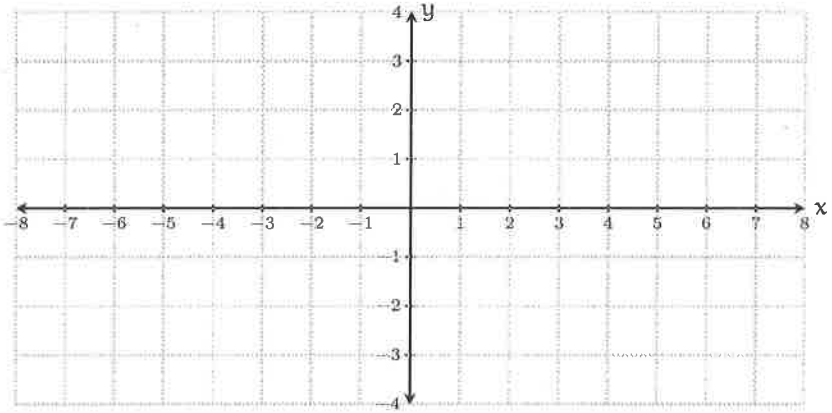
   (a) The domain of $f(x)$ is all real numbers except $x = 1$ and $x = 5$

   (b) $\lim_{x \to 1^+} f(x) = 2$, and $\lim_{x \to 1^-} f(x) = 4$

   (c) $f(x)$ is continuous at all real numbers except $x = 1$ and $x = 5$

   (d) $\lim_{x \to \infty} f(x) = 0$ and $\lim_{x \to -\infty} f(x) = 1$

   (e) The line $x = 5$ is a vertical asymptote



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

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

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

9. (10 points) Find the horizontal and vertical asymptotes of the function $f(x) = \dfrac{x^2 + x - 6}{2x^2 - 18}$.