

VCU
MATH 200
CALCULUS I

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TEST 1



February 17, 2016

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) $(-27)^{2/3} =$

(b) $\sin\left(\frac{11\pi}{6}\right) =$

(c) $\log_5(5) =$

(d) $\ln\left(\frac{1}{\sqrt{e}}\right) =$

(e) $\ln(\sin(\pi/2)) =$

(f) $\lim_{x \rightarrow 0} \frac{\sin(x)}{x} =$

(g) $\lim_{x \rightarrow \pi} \frac{\sin(x)}{x} =$

(h) $\lim_{x \rightarrow \infty} \frac{\sin(x)}{x} =$

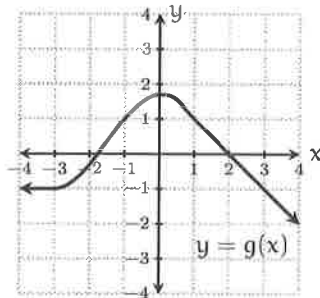
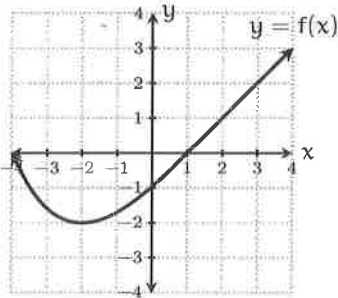
(i) $\cos^{-1}\left(-\frac{\sqrt{2}}{2}\right) =$

(j) $\lim_{x \rightarrow \pi} \cos(x) =$

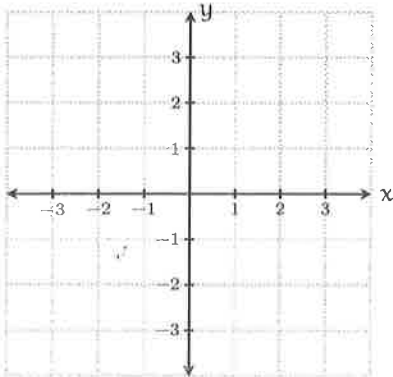
2. (10 points) For the functions $f(x)$ and $g(x)$ graphed below, find

(a) $\lim_{x \rightarrow 3} \sqrt{5f(x) + g(x)} =$

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



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



4. (20 points) Find the following limits.

(a) $\lim_{x \rightarrow 2} \frac{x^3 - 4x}{x^2 + x - 6}$

(b) $\lim_{x \rightarrow 9} \frac{\sqrt{x} - 3}{x - 9}$

(c) $\lim_{h \rightarrow 0} \frac{\frac{1}{(4+h)^2} - \frac{1}{16}}{h}$

(d) $\lim_{x \rightarrow \infty} \tan^{-1} \left(\frac{x^2 + 3x - 1}{x^2 - 2} \right)$

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

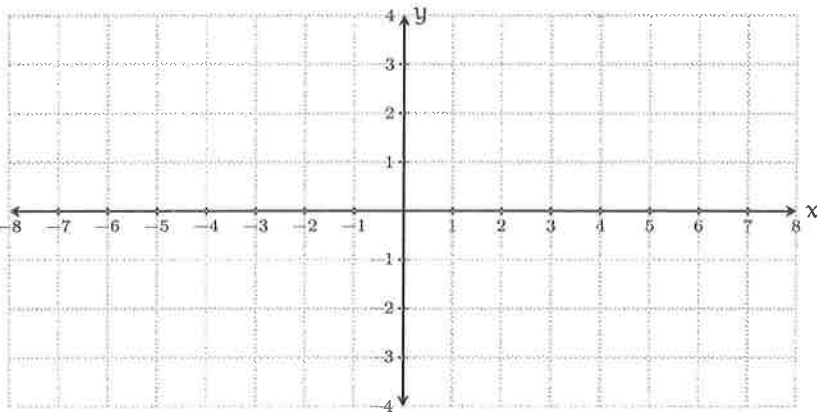
(a) The domain of $f(x)$ is all real numbers except $x = 0$

(b) $f(x)$ is continuous at all real numbers except $x = -5$ and $x = 0$

(c) $f(-3) = 0$ and $f(2) = 1$

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

(e) $\lim_{x \rightarrow 0^+} f(x) = \infty$, and $\lim_{x \rightarrow 0^-} f(x) = -\infty$



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

7. (5 points) Find the inverse of the function $f(x) = \frac{\ln(3x+1)}{3}$.

8. (10 points) Find all solutions of the equation $\sin(x) + \cos(x) = 0$.

9. (10 points) State the horizontal and vertical asymptotes of the following functions. You do not need to show any work. If there is no asymptote, write "none."

(a) $y = \ln(x)$

Horizontal:

Vertical:

(b) $y = \tan^{-1}(x)$

Horizontal:

Vertical:

(c) $y = \frac{x+1}{3x-2}$

Horizontal:

Vertical:

(c) $y = \frac{\sin(x)}{x}$

Horizontal:

Vertical:

(d) $y = e^x$

Horizontal:

Vertical: