

# Math 1910-003: Practice Test One

February 8, 2011

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Your Name:.....

## Problem 1

Find the slope of the tangent line to the graph of  $g(x) = \frac{3}{2}x^2 - x$  at the point  $(-1, \frac{5}{2})$ .

**Problem 2**

Let

$$f(x) = \begin{cases} x^2 + 4x + 2 & x < -2 \\ 1 - 4x - x^2 & \geq -2. \end{cases}$$

(a) Find  $f(-2)$ .

(b) Find

$$\lim_{x \rightarrow -2^-} f(x).$$

(c) Find

$$\lim_{x \rightarrow -2^+} f(x).$$

(d) Find

$$\lim_{x \rightarrow -2} f(x).$$

(e) Is the function  $f(x)$  continuous at  $x = -2$ ?

**Problem 3**

Find the vertical asymptotes of the function

$$h(x) = \frac{x^2 - x}{x(x + 2)}$$

**Problem 4**

Find the limit(if it exists)

(a)

$$\lim_{x \rightarrow -2} \frac{x + 2}{x^2 - 4}$$

(b)

$$\lim_{x \rightarrow 4} \frac{\sqrt{x} - 2}{x - 4}$$

**Problem 5**

Explain mathematically why the function

$$f(x) = \begin{cases} \frac{x^2-9}{x+3} & x \neq -3 \\ 10 & x = -3. \end{cases}$$

is not continuous at  $x = -3$

**Problem 6**

Find the derivative of the function

(a)

$$f(x) = x^2 - \frac{4}{x^3}$$

(b)

$$f(x) = x^{-2} - 2e^x$$

## Problem 7

Find the derivative of  $f(x) = 2x^2 + x + 2$  by the limit process.

**Problem 8**

If

$$\lim_{x \rightarrow c} f(x) = 3, \quad \lim_{x \rightarrow c} g(x) = 6$$

- (a)  $\lim_{x \rightarrow c} 4f(x)$
- (b)  $\lim_{x \rightarrow c} [f(x) + g(x)^2]$
- (c)  $\lim_{x \rightarrow c} (f(x)g(x))^2$
- (d)  $\lim_{x \rightarrow c} \frac{f(x)}{g(x)}$

**Problem 9**

Find the limit(if it exists)

(a)

$$\lim_{x \rightarrow 3} \frac{x - 3}{x^2 - 9}$$

(b)

$$\lim_{x \rightarrow 4} \frac{\sqrt{x + 5} - 3}{x - 4}$$

**Problem 10**

Find the limit

(a)

$$\lim_{x \rightarrow 0} \frac{\sin(10x)}{x}$$

(b)

$$\lim_{x \rightarrow 0} \frac{2(1 - \cos(x))}{x}$$