

Sample Quiz #2

Math 211

September 30, 2011

Name: _____

SECTION

1.4

1.5

2.1

PROBLEMS (odd)

1-21, 35-53, 63-67

37-47

5-23

Answer the following. Show your work for full credit.

1. Compute the following limits:

$$(a) \lim_{x \rightarrow 2^-} \frac{x}{x^2 - 4} \quad (b) \lim_{x \rightarrow 5^-} \frac{|x-5|}{x-5}$$

2. Let

$$f(x) = \begin{cases} x^2 & \text{if } x < 1 \\ 5 - x^2 & \text{if } 1 \leq x < 2 \\ \sqrt{x^2 - 4} & \text{if } x \geq 2 \end{cases}$$

Find (a) $\lim_{x \rightarrow 1^-} f(x)$ (b) $\lim_{x \rightarrow 1^+} f(x)$

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

3. Find the x-values (if any) at which f is not continuous. Which of the discontinuities are removable?

(a) $f(x) = \frac{|x+15|}{x+15}$ (b) $f(x) = \frac{x+1}{x^2-9}$ (c)

$$f(x) = \begin{cases} x^2 & \text{if } x < 2 \\ \sqrt{x^2 - 4} & \text{if } x \geq 2 \end{cases}$$

4. For what value of c is the function

$$f(x) = \begin{cases} cx + 1 & \text{if } x < 3 \\ cx^2 - 1 & \text{if } x \geq 3 \end{cases}$$

continuous at $x = 3$?

5. Find the derivative by the limit process: $f'(x) = \lim_{\Delta x \rightarrow 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}$

(a) $f(x) = x^2$

Answer: $f'(x) = 2x$

(b) $f(x) = x^3$

Answer: $f'(x) = 3x^2$

(c) $f(x) = \sqrt{x}$

Answer: $f'(x) = \frac{1}{2\sqrt{x}}$

(d) $f(x) = \frac{1}{x}$

Answer: $f'(x) = -\frac{1}{x^2}$

(e) $f(x) = \frac{1}{x^2}$
Answer: $f'(x) = -\frac{2}{x^3}$

6. Find the slope of the tangent line to the given function at the indicated point:

(a) $y = \frac{1}{x}$; (1,1)

Answer: $f'(x) = -\frac{1}{x^2}$ and the slope of the tangent line is $f'(1) = -\frac{1}{1^2} = -1$

(b) $y = \sqrt{x}$; (4,2)

Answer: $f'(x) = \frac{1}{2\sqrt{x}}$ and the slope of the tangent line is $f'(4) = \frac{1}{2\sqrt{4}} = \frac{1}{2(2)} = \frac{1}{4}$

(c) $y = \frac{2}{x+1}$; (0,2)

Answer: $f'(x) = -\frac{2}{(x+1)^2}$ and the slope of the tangent line is $f'(0) = -\frac{2}{(0+1)^2} = -\frac{2}{1} = -2$

(Note that we have used $f(x)$ instead of y in the problems 6(a), 6(b), and 6(c))