

MA 121 Summer I 2007

Test 1

Copy B

Name Key

Show your work on the test page or scrap paper. Each problem is worth ten points. Simplify your answers as much as possible.

- Suppose you are going to put \$100 in a savings account that earns 8% annual interest. Find the amount in the account after the following amounts of time and compound methods.
 - 3 years compounded annually **\$125.97**
 - 3 years compounded bi-monthly **\$127.07**
 - 1 year compounded monthly **\$108.30**
- Let $f(x) = \frac{3}{x-5}$. Compute $f(-1)$, $f(3)$, $f(b)$, $f(5-h)$, and $f(x+h)$.
 $f(-1) = -\frac{1}{2}$, $f(3) = -\frac{3}{2}$, $f(b) = \frac{3}{b-5}$, $f(5-h) = -\frac{3}{h}$ **and** $f(x+h) = \frac{3}{x+h-5}$
- Find the domain and range of the following.
 - $f(x) = \sqrt{x-4}$ **Domain is $[-4, \infty)$ and Range is $[0, \infty)$**
 - $f(x) = \sqrt{5-x}$ **Domain is $(-\infty, 5]$ and Range is $[0, \infty)$**
- Find the equation of the following lines.
 - The line between the points (1,2) and (4,8). **$y = 2x$**
 - The line with slope $\frac{1}{5}$ through the point (10,-4). **$y = \frac{1}{5}x - 6$**

5. Let $f(x)$ be a function with the following graph.

(a) Compute $\lim_{x \rightarrow 3^+} f(x)$, $\lim_{x \rightarrow 3^-} f(x)$ and $\lim_{x \rightarrow 3} f(x)$.

$$\lim_{x \rightarrow 3^+} f(x) = 2, \lim_{x \rightarrow 3^-} f(x) = \text{DNE and } \lim_{x \rightarrow 3} f(x) = \text{DNE}$$

(b) Find all the points of the graph where the function is not continuous.

The function is not continuous at $x = -1$ and $x = 3$ and $x = \frac{1}{2}$.

6. Compute the following limits if they exist.

(a) $\lim_{x \rightarrow -2} x^3 + 6x^2 + \frac{6}{x} = 13$

(b) $\lim_{x \rightarrow 1} \frac{x-5}{x-1} = \text{DNE}$

(c) $\lim_{x \rightarrow 3} \frac{x^2-5x+6}{x^2-9} = \frac{1}{6}$

7. Let $f(x) = -x^2 + 2x + 7$.

(a) Find the average rate of change of $f(x)$ from $x = 2$ to $x = 5$. **-5**

(b) Find the average rate of change of $f(x)$ from $x = 1$ to $x = 1 + h$ for $h = 2, 1$, and $.5$.

**When $h = 2$, the AROC is -2 When $h = 1$, the AROC is -1
When $h = .5$, the AROC is $-\frac{1}{2}$**

8. Let $f(x) = -x^2 + 2x + 7$

(a) Compute a simplified difference quotient for $f(x)$. **$-2x - h + 2$**

(b) Compute $\lim_{h \rightarrow 0} \frac{f(x+h)-f(x)}{h}$. **$-2x + 2$**

9. Find the derivatives of the following functions.

(a) $f(x) = x^5 - 2x^3 + \frac{5}{2}x^2 - 7$

$$f'(x) = 5x^4 - 6x^2 + 5x$$

(b) $f(x) = -x^2 + 3x^{-1} + \frac{5}{x^2}$

$$f'(x) = -2x - 3x^{-2} - 10x^{-3}$$

(c) $f(x) = \sqrt[4]{x^3} - \frac{9}{\sqrt[3]{x}}$

$$f'(x) = \frac{3}{4}x^{-\frac{1}{4}} + 3x^{-\frac{4}{3}}$$

10. Let $f(x) = x^3 - 3x + 8$.

(a) Find the equation of the line tangent to the graph of $f(x)$ when $x = 0$

$$y = -3x + 8$$

(b) Find all the values of x where the graph of $f(x)$ has a horizontal tangent.

$$x = \pm 1$$