MA 121 Summer I 2007
Test 1
Copy C

Name**Key**

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

1. Suppose you are going to put \$500 in a savings account that earns 4% annual interest. Find the amount in the account after the following amounts of time and compound methods.
   (a) 2 years compounded bi-annually \$541.22
   (b) 2 years compounded monthly \$541.57
   (c) 3 years compounded quarterly \$563.41
2. Let $f(x) = \frac{4}{3x-9}$. Compute $f(-1), f(3), f(b), f(3-h)$, and $f(x+h)$. $f(-1) = -\frac{1}{3}, f(3)$ **DNE,** $f(b) = \frac{4}{3b-9}, f(3-h) = -\frac{4}{3h}$ **and** $f(x+h) = \frac{4}{3x+3h-9}$
3. Find the domain and range of the following.
   (a) $f(x) =$ **Domain is** $[-4,3)\bigcup(3,\infty)$ **and Range is** $(-2,5]$
   (b) $f(x) = \sqrt{3x-4}$**Domain is** $\left[\frac{4}{3},\infty\right)$ **and Range is** $[0,\infty)$
4. Find the equation of the following lines.
   (a) The line between the points (3,3) and (4,6).$y = 3x - 6$
   (b) The line with slope $\frac{-5}{2}$ through the point (4,-4).$y = -\frac{5}{2}x + 6$

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

   (a) Compute $\lim_{x\to 3^+} f(x)$, $\lim_{x\to 3^-} f(x)$ and $\lim_{x\to 3} f(x)$.
   $\lim_{x\to 3^+} f(x) = 5$, $\lim_{x\to 3^-} f(x) = 5$ **and** $\lim_{x\to 3} f(x) = 5$

   (b) Find all the points of the graph where the function is not continuous.
   The function is not continuous at $x = -1$ **and** $x = -3$**.**

6. Compute the following limits if they exist.

   (a) $\lim_{x\to 1} x^3 - 2x + \frac{4}{x} = 3$

   (b) $\lim_{x\to -2} \frac{x^2+3x+1}{x^2-4}$ = **DNE**

   (c) $\lim_{x\to 2} \frac{x+2}{3-x} = 4$

7. Let $f(x) = 3x^2 + x - 7$.

   (a) Find the average rate of change of $f(x)$ from $x = 2$ to $x = 5$. **22**

   (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 13 When** $h = 1$**, the AROC is 10**
   When $h = .5$**, the AROC is 8.5**

8. Let $f(x) = 3x^2 + x - 7$

   (a) Compute a simplified difference quotient for $f(x)$. $6x + 3h + 1$

   (b) Compute $\lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$. $6x + 1$

9. Find the derivatives of the following functions.

   (a) $f(x) = 2x^6 - x^4 + \frac{5}{3}x^3 + 17$
   $f'(x) = 12x^5 - 4x^3 + 5x^2$

   (b) $f(x) = 3x^2 - 7x^{-1} + \frac{1}{x^5}$
   $f'(x) = 6x + 7x^{-2} - 5x^{-6}$

   (c) $f(x) = \frac{-1}{4}\sqrt[5]{x^4} - \frac{2}{\sqrt{x}}$
   $f'(x) = -\frac{1}{5}x^{-\frac{1}{5}} + x^{-\frac{3}{2}}$

10. Let $f(x) = x^3 - 3x^2 - 24x + 2$.

    (a) Find the equation of the line tangent to the graph of $f(x)$ when $x = 0$
    $y = -24x + 2$

    (b) Find all the values of x where the graph of $f(x)$ has a horizontal tangent.
    $x = -2$ **and** $x = 4$