MA 121 Summer I 2007
Test 1
Copy A

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 $1000 in a savings account that earns 6% annual interest. Find the amount in the account after the following amounts of time and compound methods.
   (a) 2 years compounded annually $1123.60
   (b) 2 years compounded quarterly $1126.49
   (c) 1 year compounded daily $1061.83
2. Let $f(x) = \frac{5}{2-x}$. Compute $f(-1), f(3), f(b), f(2-h)$, and $f(x+h)$. $f(-1) = \frac{5}{3}, f(3) = -5, f(b) = \frac{5}{2-b}, f(2-h) = \frac{5}{h}$ **and** $f(x+h) = \frac{5}{2-x-h}$
3. Find the domain and range of the following.
   (a) $f(x) =$ **Domain is** $[-5, 5)$ **and Range is** $(-3, \infty)$
   (b) $f(x) = \sqrt{2x+5}$**Domain is** $\left[-\frac{5}{2}, \infty\right)$ **and Range is** $[0, \infty)$
4. Find the equation of the following lines.
   (a) The line between the points (2,3) and (4,9).$y = 3x - 3$
   (b) The line with slope $\frac{-2}{3}$ through the point (6,-4). $y = -\frac{2}{3}x$

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 $\lim_{x\to 3} f(x)$.
   $\lim_{x\to 3^+} f(x) = 5$, $\lim_{x\to 3^-} f(x) = 2$ **and** $\lim_{x\to 3} f(x) = DNE$

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

6. Compute the following limits if they exist.

   (a) $\lim_{x\to 3} x^3 - 6x + \frac{9}{x} = 12$

   (b) $\lim_{x\to 1} \frac{x^2-5x+4}{x^2-1} = -\frac{3}{2}$

   (c) $\lim_{x\to 2} \frac{5x-5}{2x-4}$ = **DNE**

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

   (a) Find the average rate of change of $f(x)$ from $x = 2$ to $x = 5$.
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   (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 5 When** $h = 1$**, the AROC is 3**
   When $h = .5$**, the AROC is 2**

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

   (a) Compute a simplified difference quotient for $f(x)$.
   $4x + 2h - 3$

   (b) Compute $\lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$.
   $4x - 3$

9. Find the derivatives of the following functions.

   (a) $f(x) = x^8 - 3x^4 + \frac{1}{3}x^3 - 7$
   $f'(x) = 8x^7 - 12x^3 + x^2$

   (b) $f(x) = 2x^2 - x^{-1} + \frac{3}{x^4}$
   $f'(x) = 4x + x^{-2} - 12x^{-5}$

   (c) $f(x) = \sqrt[3]{x^4} - \frac{6}{\sqrt{x^3}}$
   $f'(x) = \frac{4}{3}x^{\frac{1}{3}} + 9x^{-\frac{5}{2}}$

10. Let $f(x) = 2x^3 + 3x^2 - 36x - 3$.

    (a) Find the equation of the line tangent to the graph of $f(x)$ when $x = 0$
    $y = -36x - 3$

    (b) Find all the values of x where the graph of $f(x)$ has a horizontal tangent.
    $x = 2$ **and** $x = 3$