

Name \_\_\_\_\_ DUE DATE: \_\_\_\_\_

**Directions:**

- Read each problem carefully and use your knowledge of mathematics to determine your answer.
- In order to receive FULL CREDIT you must either SHOW ALL WORK or EXPLAIN how you got your answer!! PLEASE NOTE: A multiple choice answer alone without any work will only receive half credit.

Question	Your Work/Explanation
<p>1) What is the instantaneous rate of change at <math>x = 2</math> of the function <math>f</math> given by <math>f(x) = \frac{x^2-2}{x-1}</math> ?</p> <p>(a) -2                      (b) <math>\frac{1}{6}</math></p> <p>(c) <math>\frac{1}{2}</math>                      (d) 2</p>	
<p>2) The line normal to the curve <math>y = \sqrt{16 - x}</math> at the point (0,4) has slope</p> <p>(a) 8                          (b) <math>\frac{1}{8}</math></p> <p>(c) <math>-\frac{1}{8}</math>                      (d) -8</p>	
<p>3) If <math>f(x) = -x^3 + x + \frac{1}{x}</math>, then <math>f'(-1) =</math></p> <p>(a) 3                          (b) 1</p> <p>(c) -1                        (d) -3</p>	

4) Let  $f$  be a continuous function on  $[-3,6]$ . If  $f(-3) = -1$  and  $f(6) = 3$ , then the Intermediate Value Theorem guarantees that

- (a)  $f(0) = 0$
- (b)  $f'(c) = \frac{4}{9}$  for at least one  $c$  on  $(-3,6)$
- (c)  $-1 \leq f(x) \leq 3$  for all  $x$  on  $(-3,6)$
- (d)  $f(c) = 1$  for at least one  $c$  on  $(-3,6)$

5)  $\lim_{h \rightarrow 0} \frac{\sin(x+h) - \sin x}{h}$

- (a) 0    (b) 1    (c)  $\sin x$     (d)  $\cos x$

6) What is  $\lim_{n \rightarrow \infty} \frac{4n^2}{n^2 + 10,000n}$

- (a) 0                      (b)  $\frac{1}{2,500}$   
(c) 4                        (d) nonexistent

<p>7) If <math>\lim_{x \rightarrow 3} f(x) = 7</math>, which of the following must be true?</p> <p>I. <math>f</math> is continuous at <math>x = 3</math>. II. <math>f</math> is differentiable at <math>x = 3</math>. III. <math>f(3) = 7</math></p> <p>(a) II only            (b) III only (c) I and III only    (d) none</p>	
<p>8) Find the values of <math>a</math> and <math>b</math> such that</p> $f(x) = \begin{cases} 5x + 2, & x < 1 \\ ax^2 + bx, & x \geq 1 \end{cases}$ <p>is differentiable for all <math>x</math>.</p> <p>(a) <math>a = 1, b = 2</math>      (b) <math>a = 4, b = -7</math> (c) <math>a = -2, b = 9</math>    (d) <math>a = -5, b = 0</math></p>	
<p>9) At what point on the graph of <math>y = \frac{1}{2}x^2</math> is the tangent line parallel to the line <math>2x - 4y = 3</math>?</p>	
<p>10) What is the average rate of change of <math>f(x) = 2x^3 - x</math> over the interval <math>[-1, 2]</math>.</p> <p>(a) 5      (b) 6      (c) 13      (d) 36</p>	

11) Find an equation of the tangent line to the graph  $y = \frac{2x+3}{3x-2}$  at the point (1,5).

12) Find the partial fraction decomposition for :  $\frac{1-x}{2x^2+x}$

