

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) Evaluate $\log_a a^3$</p> <p>(a) a^3 (b) a (c) 3</p> <p>(d) $3a$ (e) none of these</p> | |
| <p>2) Expand: $\log \sqrt[3]{\frac{a^2b}{c}}$</p> <p>(a) $\sqrt[3]{\frac{2\log a + \log b}{\log c}}$ (b) $\frac{1}{3} \left(\frac{2\log a + \log b}{\log c} \right)$</p> <p>(c) $\frac{1}{3} (2\log a + \log b - \log c)$</p> <p>(d) $\sqrt[3]{2\log a^2 + \log b - \log c}$</p> | |
| <p>3) If $f(x) = \tan 2x$, then $f' \left(\frac{\pi}{6} \right) =$</p> <p>(a) $2\sqrt{3}$ (b) 4</p> <p>(c) $4\sqrt{3}$ (d) 8</p> | |

4) Find the instantaneous rate of change of $f(t) = (2t^3 - 3t + 4)\sqrt{t^2 + 3t + 4}$ at $t = 0$.

- (a) -3 (b) $-\frac{3}{4}$
(c) 0 (d) -4

5) Find $\frac{d}{dx} \cos^2(x^3)$

- (a) $6x^2 \sin(x^3) \cos(x^3)$
(b) $6x^2 \cos(x^3)$
(c) $-6x^2 \sin(x^3) \cos(x^3)$
(d) $-2 \sin(x^3) \cos(x^3)$

6) Let $f(x) = \sqrt{x}$. If the rate of change of f at $x = c$ is twice its rate of change at $x = 1$, then $c =$

- (a) $\frac{1}{4}$ (b) 1 (c) 4 (d) $\frac{1}{\sqrt{2}}$

7) The curve of $y = \frac{2x^2}{4 - x^2}$ has

- (a) two horizontal and one vertical asymptote
(b) two vertical but no horizontal asymptotes
(c) one horizontal and one vertical asymptote
(d) one horizontal and two vertical asymptotes

8) Suppose $f(x) = \begin{cases} x^2, & x < -2 \\ 4, & -2 < x \leq 1 \\ 6 - x, & x > 1 \end{cases}$

Which statement is true?

- (a) f is discontinuous only at $x = -2$
- (b) f is discontinuous only at $x = 1$
- (c) f is continuous everywhere
- (d) f is discontinuous at $x = -2$ and $x = 1$

9) Simplify: $\ln \sqrt[3]{e^2 x}$

- (a) $\frac{2e}{3} + \frac{1}{3} \ln x$
- (b) $\frac{2}{3} + \ln \frac{x}{3}$
- (c) $\frac{2}{3} + \frac{1}{3} \ln x$
- (d) $\frac{2e}{3} + \ln \frac{x}{3}$

10) If $f(x) = \begin{cases} \frac{x^2 - 6x}{x}, & x \neq 0 \\ 2k - 1, & x = 0 \end{cases}$ and if f is

continuous at $x = 0$, then $k =$

- (a) -6
- (b) $-\frac{5}{2}$
- (c) 0
- (d) $\frac{5}{2}$

11) If $f(x) = \frac{256}{\sqrt{x}} + 64\sqrt{x} + 3\sqrt[3]{x^2}$, then
 $f'(64) = ?$

12) If $f(5) = 3$ and $f'(5) = -2$, find the
derivative of $x^2f(x)$ at $x = 5$.