

MA123 Exam 1

February 06 2008

NAME _____ Section _____

Problem	Answer				
1	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
2	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
3	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
4	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
5	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
6	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
7	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
8	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
9	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
10	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
11	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
12	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
13	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
14	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
15	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>

Instructions. Circle your answer in ink on the page containing the problem and on the cover sheet. After the exam begins, you may not ask a question about the exam. Be sure you have all pages (containing 15 problems) before you begin. A list of formulas that may be useful for this exam is on the last page (you may tear this page off if you wish).

For grading use:

Number of problems correct: _____/15

SCORE: _____/100

NAME _____

1. Find the domain of the function

$$F(s) = \frac{1}{\sqrt{s^2 - 1}}$$

- (a) All s such that either $-\infty < s < -1$ or $1 < s < \infty$
 - (b) All s such that $-1 < s < 1$
 - (c) All s such that $-\infty < s < \infty$
 - (d) All s such that either $-\infty < s < 1$ or $1 < s < \infty$
 - (e) All s such that $0 < s < 1$
2. If the line given by $s = A + B(t - 1)$ is perpendicular to the line $s = t$ and contains the point $(1, 6)$ in the (t, s) -plane, then
- (a) $A = 1, B = 4$
 - (b) $A = 4, B = 1$
 - (c) $A = 1, B = 6$
 - (d) $A = 4, B = -1$
 - (e) $A = 6, B = -1$
3. Find the average rate of change of the function

$$R(t) = \sqrt{2t + 7}$$

as t changes from 1 to 9.

- (a) $\frac{1}{3}$
- (b) $\frac{1}{2}$
- (c) $\frac{1}{4}$
- (d) 4
- (e) 3

4. Which of the following is true for the function $f(x) = |x - 1|$?

- (a) f is differentiable at $x = 1$ and $x = 2$.
- (b) f is differentiable at $x = 1$, but not at $x = 2$.
- (c) f is differentiable at $x = 2$, but not at $x = 1$.
- (d) f is not differentiable at either $x = 1$ or $x = 2$.
- (e) None of the above.

5. Suppose the height of an object above ground at time t (in seconds) is measured by $h(t)$ (in feet). If

$$h(t) = -16t^2 + 40t + 120,$$

what is the speed of the object at time $t = 0$?

- (a) 16 feet per second
- (b) 32 feet per second
- (c) 120 feet per second
- (d) 40 feet per second
- (e) 56 feet per second

6. Find

$$\lim_{r \rightarrow 1} \frac{r^2 - 3r + 2}{r - 1}$$

- (a) 1
- (b) 0
- (c) -1
- (d) 2
- (e) Does not exist

7. Consider a triangle with base x and height $2x$. Find the instantaneous rate of change of the area of the triangle with respect to x when $x = 5$.

- (a) 1
- (b) 2
- (c) 5
- (d) 10
- (e) 20

8. For the function

$$f(x) = \begin{cases} 4x^2 - 1 & \text{if } x < 1 \\ 3x + 2 & \text{if } x \geq 1 \end{cases}$$

find

$$\lim_{x \rightarrow 1^+} f(x)$$

- (a) 5
- (b) 3
- (c) 1
- (d) 0
- (e) Does not exist

9. Let $g(s) = s^2 - 3s + 1$. Find a value $A \geq 0$ such that the average rate of change of $g(s)$ from 0 to A equals 8.

- (a) 0
- (b) 8
- (c) 11
- (d) 15
- (e) 22

10. Find all values of a such that the function

$$f(x) = \begin{cases} x^2 + 2x & \text{if } x < a \\ -1 & \text{if } x \geq a \end{cases}$$

is continuous everywhere.

- (a) $a = -1$ only
 - (b) $a = -2$ only
 - (c) $a = -1$ and $a = 1$
 - (d) $a = -2$ and $a = 2$
 - (e) all real numbers
11. Let $f(t) = 3t^2 + 6t + 1$. Find the value of t for which the tangent line to the graph of $f(t)$ has slope 1.
- (a) -1
 - (b) $-\frac{5}{6}$
 - (c) 0
 - (d) $\frac{7}{6}$
 - (e) 6
12. A train travels from city A to city B to city C . The distance from A to B is 20 miles. The distance from B to C is 45 miles. The train took 1 hour for the trip from A to B , stopped at city B for 30 minutes, and then went from B to C at an average speed of 30 miles per hour. What was the average speed of the train for the entire trip (in miles per hour)?
- (a) 65
 - (b) 25
 - (c) $\frac{65}{2}$
 - (d) 50
 - (e) $\frac{65}{3}$

13. Find the instantaneous rate of change of the function $H(t) = t^3$ at $t = 2$.

- (a) 2
- (b) 3
- (c) 8
- (d) 12
- (e) 27

14. If $R(t) = t + 2$ and $R(Q(t)) = t$ then

- (a) $Q(t) = 2t$
- (b) $Q(t) = t$
- (c) $Q(t) = t - 2$
- (d) $Q(t) = t + 2$
- (e) $Q(t) = 2 - t$

15. Suppose the cost $C(q)$ (in dollars) of producing a quantity q of a product equals

$$C(q) = 500 + 2q + \frac{1}{5}q^2$$

The marginal cost $M(q)$ equals the instantaneous rate of change of the total cost. Find the marginal cost when a quantity of 10 items are being produced.

- (a) 2
- (b) 6
- (c) 10
- (d) 20
- (e) 500

List of Formulas:

1. You may use the following formula for the derivative of a quadratic function. If

$$p(x) = Ax^2 + Bx + C$$

then

$$p'(x) = 2Ax + B$$

2. The area of a triangle with base b and height h is $\frac{1}{2}bh$
3. If you cover a distance of d miles in t hours at a rate of r miles per hour, then $d = rt$