MA 22300 **EXAM 1** **Form A**

NAME_____ INSTRUCTOR_____

INSTRUCTIONS

1. Fill in your name and your instructor's name above.
2. You must use a #2 pencil on the scantron answer sheet.
3. Fill in your name, your four digit section number, and your student identification number. Make sure to blacken in the appropriate spaces. If you do not know your section number, ask your instructor. (Leave the test/quiz number blank.) Sign your name.
4. There are 15 questions. Blacken in your choice of the correct answer in the spaces provided on the scantron answer sheet. **Only the scantron answer sheet will be graded. When you have completed the exam, turn in the scantron answer sheet only. You may take the exam booklet with you.**
5. **The exam is self-explanatory. Do not ask your instructor any questions about the exam problems.**
6. **Only one-line calculators (any brand) are allowed. Cell phones and PDA's may not be used as a calculator and must be put away during the exam. NO BOOKS OR PAPERS ARE ALLOWED. Use the back of the test pages for scrap paper.**

Volume & Surface Area

Right Circular Cylinder

$V = \pi r^2 h$

$SA = \begin{cases} 2\pi r^2 + 2\pi rh \\ \pi r^2 + 2\pi rh \end{cases}$

Sphere

$V = \frac{4}{3}\pi r^3$

$SA = 4\pi r^2$

Right Circular Cone

$V = \frac{1}{3}\pi r^2 h$

$SA = \pi r\sqrt{r^2 + h^2} + \pi r^2$

1. Factor and simplify the following expression.

$$16(x-3)^3(x-4)^3 + 8(x-3)^2(x-4)^4$$

A. $24(x-3)^2(x-4)^3$

B. $8(x-3)^2(x-4)^3(3x-7)$

C. $24(x-3)^2(x-4)^3(x-3)(x-4)$

D. $7x-20$

E. $8(x-3)^2(x-4)^3(3x-10)$

2. If $f(x) = x^2 - x + 3$ and $f'(x) = 2x - 1$, find the average rate of change of f as x changes from 1 to 1.2

A. 1.2

B. 0.24

C. 1

D. 1.4

E. 2

3. An appliance manufacturer's cost of producing q refrigerators is $C(q) = q^2 + 2q + 1000$ dollars. Suppose that on a typical work day, $q(t) = 5t + 1$ refrigerators are produced in t hours. Express the production cost in terms of t.

A. $C(t) = 25t^2 + 20t + 1003$

B. $C(t) = 5t^3 + 11t^2 + 5002t + 1000$

C. $C(t) = 25t^2 + 10t + 1003$

D. $C(t) = 25t^2 + 5t + 1002$

E. $C(t) = 25t^2 + 15t + 1002$

4. Let $K(t) = \dfrac{1}{t^2 - 1}$. Find $K(3s - 1)$ and simplify.

   A. $\dfrac{1}{9s^2 - 6s - 2}$

   B. $\dfrac{1}{9s^2 + 6s - 2}$

   C. $\dfrac{1}{9s^2 - 6s}$

   D. $\dfrac{1}{9s^2 - 2}$

   E. $\dfrac{-9s^2 - 6s}{9s^2 - 6s + 1}$

5. Evaluate the limit if it exists: $\lim\limits_{t \to \infty} \dfrac{3 - 4t^2}{(t - 2)(1 - 2t)}$

   A. -2

   B. 2

   C. 4

   D. $+\infty$

   E. The limit does not exist

6. Find the indicated limit.

$$\lim_{x\to 3^+} \frac{\sqrt{5x+1}-4}{5x-15}$$

A. $-1/8$

B. $1/8$

C. $-\infty$

D. ∞

E. 0

7. The quantity $\lim_{h\to 0} \frac{\sqrt{9+h}-3}{h}$ represents which of the following?

A. $f'(3), when\ f(x) = \sqrt{x}$

B. $f(9), when\ f(x) = \sqrt{x}$

C. $f(6), when\ f(x) = \sqrt{x+3}$

D. $f'(-3), when\ f(x) = \sqrt{x+9}$

E. $f'(6), when\ f(x) = \sqrt{x+3}$

8. Find all values of x such that $f(g(x)) = g(f(x))$ where $f(x) = x^2 - 2$ and $g(x) = 1 - x$. Choose the answer that best describes the solution(s).

   A. There are two solutions, one is positive and one is negative.

   B. All real values of x.

   C. There are two solutions, both are positive.

   D. $f(g(x)) \neq g(f(x))$

   E. There are two solutions, both are negative.

9. Evaluate $\lim_{h \to 0} \dfrac{3(x+h)^2 - 2(x+h) - (3x^2 - 2x)}{h}$.

   A. $6x - 2$

   B. $2x - 2$

   C. $-2x - 2$

   D. $6x + 2$

   E. -2

10. If $f(x) = \frac{3}{4}x^2 - 1$, find the slope of the tangent line to the graph of f when $x = -2$.

A. 2

B. -4

C. 3

D. -3

E. $\frac{(-5)}{2}$

11. Let $f(x)$ and $g(x)$ be functions defined as follows

$$f(x) = \frac{x+8}{x^2+7x-8},\ g(x) = \begin{cases} x^2-4 & , x \neq 0 \\ 7 & , x = 0 \end{cases}$$

Which of the following is true?

I. $\lim_{x \to -8} f(x)$ exists

II. $f(x)$ is continuous

III. $\lim_{x \to 0} g(x)$ exists

A. I only

B. III only

C. I and II

D. I and III

E. I, II, and III

12. A cylindrical can with no top is to be made using 60π square inches of a thin sheet of metal. Express the volume of the can as a function of its radius.

A. $\pi r(30 - r^2)$

B. $\pi r(30 - \frac{r^2}{2})$

C. $\pi r(30 + r^2)$

D. $\pi r(30 + \frac{r^2}{2})$

E. $2\pi r(30 - \frac{r^2}{2})$

13. A city tour bus has 100 available seats. Experience shows that when the city tour costs \$250.00 per seat, all the seats on the bus will be sold. For each additional \$5.00 charged, 3 fewer seats will be sold. Express the revenue made from a single city tour, in terms of x, the number of \$5.00 changes in price.

A. $R(x) = 25000 - 250x - 15x^2$

B. $R(x) = 2500 + 250x - 5x^2$

C. $R(x) = 25000 - 650x - 3x^2$

D. $R(x) = 2500 - 250x + 15x^2$

E. $R(x) = 25000 + 250x + 15x^2$

14. A company wants to build a rectangular playground. The playground is to be surrounded by a fence. The east and west sides of the fence cost \$5 per foot to build, and the north and south sides of the fence cost \$10 per foot to build. The budget is \$1000. Determine the length of the east and west sides of the fence such that the area the fence encloses is maximized.

    A. 10

    B. 50

    C. 24

    D. 38

    E. 60

15. Find $\lim_{x \to 1/2} \dfrac{2x^2 + x - 1}{4x^2 - 1}$

    A. $\frac{1}{2}$

    B. $\frac{3}{4}$

    C. $+\infty$

    D. The limit does not exist

    E. 3