

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**

$$V = \pi r^2 h$$

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

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. Let $f(x) = 7 - 3x$, find

$$\frac{f(x+h) - f(x)}{h}$$

- A. $-3h$
B. $3h$
C. -3
D. 3
E. $-3 + h$
2. Compute the following limit.

$$\lim_{x \rightarrow 7} \frac{x^2 - 4x - 21}{x^2 - 49}$$

- A. $\frac{5}{7}$
B. $\frac{2}{7}$
C. 10
D. 0
E. 4
3. If $f(x) = \frac{1}{x-3}$, find the instantaneous rate of change of f at $x = 1$.
- A. $1\frac{1}{2}$
B. $-\frac{1}{16}$
C. 1
D. $-\frac{1}{4}$
E. 0

4. Factor and completely simplify the following expression:

$$\frac{3(2x + 5)^3(5x - 3)^4 - 5(2x + 5)^4(5x - 3)^3}{(2x + 5)^4(5x - 3)^6}.$$

- A. $\frac{5x-16}{(5x-3)^2}$
- B. $\frac{5x-16}{(2x+5)(5x-3)^2}$
- C. $\frac{5x-34}{(2x+5)(5x-3)^2}$
- D. $\frac{5x-16}{(2x+5)(5x-3)^3}$
- E. $\frac{5x-34}{(2x+5)(5x-3)^3}$

5. Bill finds that the cost of producing t tables at his factory is $C(t) = 2t^2 - 3t + 50$. On an average day $t(h) = 3h - 1$ tables are produced during h hours of work. Express the production cost in terms of h .

- A. $C(h) = 18h^2 - 21h + 49$
- B. $C(h) = 18h^2 - 9h + 55$
- C. $C(h) = 12h^2 - 21h + 55$
- D. $C(h) = 18h^2 - 9h + 49$
- E. $C(h) = 18h^2 - 21h + 55$

6. The base of a closed box is a rectangle whose width, w , is half its length, x . If the volume of the box is 1800 cubic centimeters, which one of the following expressions represents the surface area of the box as a function of the width of the base?

- A. $4w^2 + \frac{5400}{w}$
- B. $2w^2 + 1800$
- C. $4w^2 + \frac{3600}{w}$
- D. $2w^2 + \frac{5400}{w}$
- E. $4w^2 + 3600$

7. At which values of x is the function $f(x) = \frac{2-x}{x^2-x-2}$ not continuous?

- A. 1 and -2
- B. -1 and 2
- C. -1 only
- D. 2 only
- E. 1 only

8. Find the average rate of change of $f(x)$, as x changes from 1 to 1.5, if $f(x) = x - 3x^2$.
- A. Average rate of change = $\frac{13}{4}$
 - B. Average rate of change = $-\frac{13}{2}$
 - C. Average rate of change = -2
 - D. Average rate of change = $-\frac{13}{4}$
 - E. Average rate of change = 2

9. Given $f(x) = \frac{2+x}{x}$ and $g(x) = \frac{2}{x}$, find $f(g(x))$.

- A. $x + 1$
- B. 2
- C. $\frac{2x}{2+x}$
- D. $2x + 1$
- E. 3

10. A restaurant which is located in an aquarium is investigating a potential new menu item named The Deep-as-the-Sea Dish Pizza, a deep dish pizza which is to be in the shape of a right circular cylinder (with top and bottom). The pizza is intended to have a volume of 40π cubic inches. In order to ensure that the pizza is cooked properly in the restaurant's facilities, the restaurant will need to know the surface area of the pizza. Express the surface area (S) of the pizza as a function of its radius (r).

A. $S(r) = 2\pi r^2 + \frac{80\pi}{r}$

B. $S(r) = \pi r^2 + \frac{80\pi}{r}$

C. $S(r) = 20\pi r - \pi r^3$

D. $S(r) = 20\pi r - \frac{\pi r^3}{2}$

E. $S(r) = \pi r \sqrt{r^2 + \frac{14400}{r^4}} + \pi r^2$

11. Find $\lim_{x \rightarrow -\infty} \frac{1 + 3x + 2x^2}{-3 + x^2 - 4x^3}$.

A. $-\frac{1}{3}$

B. $-\frac{1}{2}$

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

D. 0

E. $+\infty$

12. Find all values of x such that $f(g(x)) = g(f(x))$ where $f(x) = \frac{x+1}{x}$ and $g(x) = 2x$. Choose the answer that best describes the solution(s).
- A. There is one positive solution
 - B. There are no solutions
 - C. There are two solutions, one is 0 and one is negative
 - D. There is one negative solution
 - E. All real values of x are solutions
13. A software company is selling a new operating system. The company spends \$20 to produce one package of this software. In the first month only 500 packages were sold at a price of \$45. To improve sales, the company wants to decrease the price. It has been estimated that for each \$2 decrease, 50 more packages will be sold. Express the company's profit, P , as a function of the price, x , of the software.
- A. $P(x) = 62500 + 1025x + x^2$
 - B. $P(x) = -55000 + 2850x - 50x^2$
 - C. $P(x) = -10000 + 400x + 50x^2$
 - D. $P(x) = -32500 + 2125x - 25x^2$
 - E. $P(x) = 1625x - 25x^2$

14. Compute the following limit.

$$\lim_{x \rightarrow 2^-} \frac{x^2 + 4x}{x - 2}$$

- A. 4
- B. 1
- C. $-\infty$
- D. -2
- E. ∞

15. If $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} = \lim_{h \rightarrow 0} \frac{3(x+h)^2 - (x+h) + 2 - (3x^2 - x + 2)}{h}$ for some function f , find the slope of the line tangent to the graph of f when $x = -2$.

- A. -11
- B. -1
- C. -13
- D. 16
- E. 1