

The following 14 multiple choice questions are worth 5 points each.

1. Solve :  $\frac{2}{x-4} - \frac{3}{x+3} = \frac{-4}{x^2-x-12}$

- a.  $x = -2$
- b.  $x = 22$
- c.  $x = 11$
- d.  $x = -22$
- e. No Real solution

2. Solve:  $6x^2 - 7x + 2 = 0$

- a.  $x = \frac{2}{3}$  or  $x = \frac{1}{2}$
- b.  $x = \frac{1}{6}$  or  $x = 1$
- c.  $x = \frac{4}{3}$  or  $x = 1$
- d.  $x = -\frac{2}{3}$  or  $x = -\frac{1}{2}$
- e.  $x = 3$  or  $x = 4$

3. Use the discriminant to determine the number of real solutions to the following quadratic equation.

$$x^2 - 2x + 19 = 0$$

- a. No real solutions
- b. One real solution
- c. Two real solutions

4. Solve  $S_n = \frac{n}{2}(a_1 + a_n)$  for  $a_1$ .

a.  $a_1 = \frac{2S_n - n}{a_n}$

b.  $a_1 = \frac{2S_n}{n \cdot a_n}$

c.  $a_1 = \frac{2S_n}{n} - a_n$

d.  $a_1 = S - \frac{n}{2} - a_n$

e.  $a_1 = 2S_n - n - 4n \cdot a_n$

5. Solve and express your answer in interval notation.

$$\frac{1}{3}(x-2)+1 \geq x+4$$

a.  $\left(-\infty, -\frac{11}{2}\right]$

b.  $(3, \infty)$

c.  $(-\infty, 6)$

d.  $\left[-\frac{8}{3}, \frac{3}{2}\right]$

e.  $\left(-\infty, -\frac{15}{2}\right]$

6. Given the following piece-wise function, determine  $f(35)$ .

$$f(x) = \begin{cases} x^2 & \text{if } x < 16 \\ 225 + 15(x-15) & \text{if } x \geq 16 \end{cases}$$

a. 1225

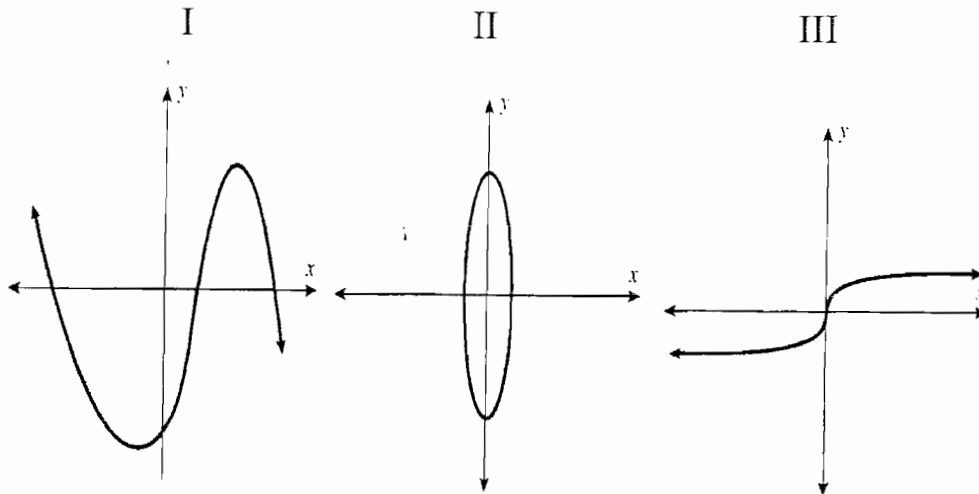
b. 525

c. 245

d. 361

e. 260

7. Which of the following graphs represent functions?



- a. I and III  
b. I and II  
c. I only  
d. II and III  
e. All are graphs of functions

8. Determine which of the following equations do not define  $y$  as a function of  $x$ .

- a.  $x+2y=10$   
b.  $x^2+10y=400$   
c.  $y=\sqrt{x+9}$   
d.  $x=y^2$   
e.  $x^2-y=2\pi r$

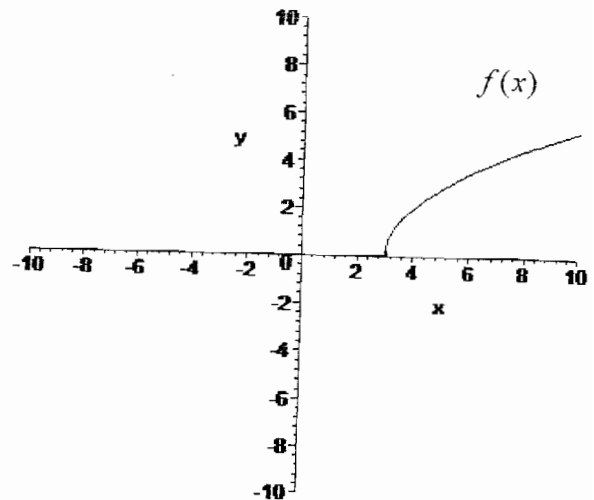
9. Given  $f(x) = -2x^2 + 3x - 7$ , evaluate the difference quotient,

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

- a.  $-2h$
- b.  $-4x - 2h + 3$
- c. 1
- d.  $4x + 2h + 3$
- e.  $4x - 2h$

10. Given the following graph of the function,  $f(x) = \sqrt{x^2 - 9}$ , determine which of the following statements is/are true.

- I. The domain of the function is  $[0, \infty)$ .
- II. The range of the function is  $[0, \infty)$ .
- III.  $f(5) = 16$
- IV.  $f(x) \geq 0$  throughout its domain.



- a. All are true
- b. II, III, and IV are true
- c. I, II, and IV are true
- d. I, III, and IV are true
- e. II and IV are true

11. Determine the slope of the straight line that passes through the points,  $(a-b, c)$  and  $(3a, a+c)$ .

a.  $m = \frac{2a+b}{a}$

b.  $m = \frac{a+2c}{4a-b}$

c.  $m = \frac{a}{2a+b}$

d.  $m = \frac{a}{2a-b}$

e. The slope cannot be determined

12. Determine the equation that results from the following transformations:

I. The square root function is shifted 4 units to the right;

II. The graph is stretched/shrunk vertically by a factor of  $\frac{1}{3}$ ;

III. It is reflected across the x-axis;

II. The graph is translated 5 units upward.

a.  $y = -\frac{1}{3}\sqrt{x+4} + 5$

d.  $y = \frac{1}{3}\sqrt{x+4} + 5$

b.  $y = \frac{1}{3}\sqrt{x-4} + 5$

e.  $y = -\frac{1}{3}\sqrt{x-5} + 4$

c.  $y = -\frac{1}{3}\sqrt{x-4} + 5$

13. Under the transformation  $g(x) = 2f(x) + 4$ , the point  $(a, b)$  will be translated to which point?

- a.  $(2a, b + 4)$
- b.  $(2(a + 4), b)$
- c.  $(a, 2(b + 4))$
- d.  $(2a + 4, b)$
- e.  $(a, 2b + 4)$

14. Determine the equation of the line that passes through the point  $(-2, 4)$  and is perpendicular to the line,  $3x - 5y + 2 = 0$ . What is the value of the y-intercept?

- a.  $-\frac{5}{3}$
- b.  $\frac{14}{3}$
- c.  $\frac{26}{5}$
- d.  $\frac{14}{5}$
- e.  $\frac{2}{3}$

Name \_\_\_\_\_ Instructor \_\_\_\_\_

Section \_\_\_\_\_

Questions 15-17 are free response. Pages 8 and 9 should be turned in with your answer sheet.

15. A utility company has a fleet of vans. The annual operating cost,  $C$ , per van is,

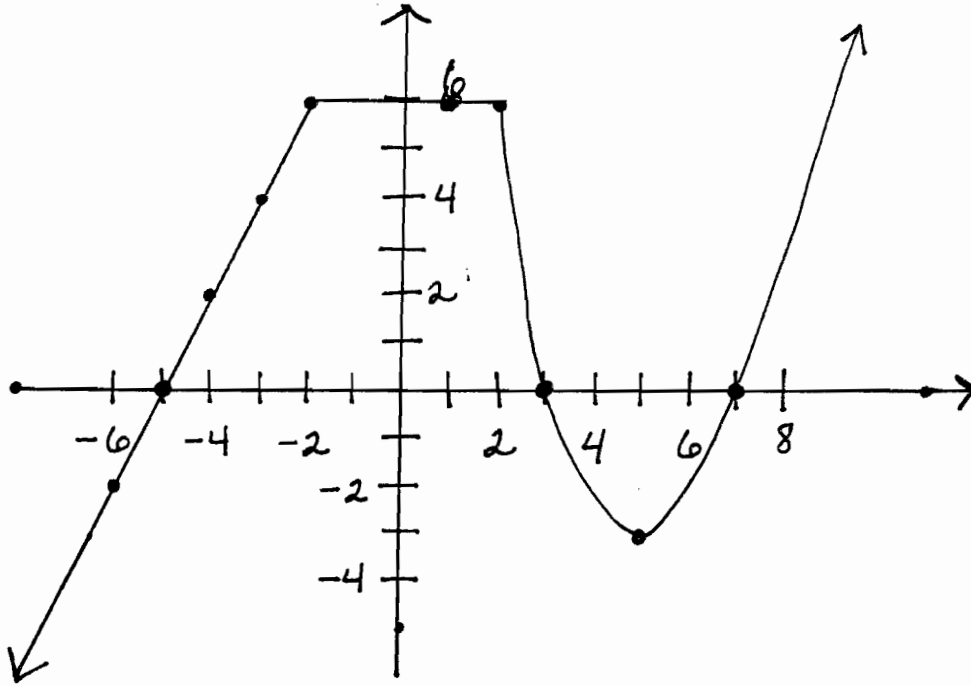
$$C = 0.32m + 2300$$

where  $m$  is the number of miles traveled by a van in a year.  
What number of miles will yield an annual operating cost that is less than \$10,000? [6 points]

16. Solve the following quadratic equation and express your answer in simplest radical form. [To receive credit, show all work].  
[8 pts]

$$6x^2 - 8x = 2$$

17. Given the graph of  $f$ , determine each of the following. Express your answer in interval notation (whenever applicable). [2 points each]



- a. Domain \_\_\_\_\_
- b. Range \_\_\_\_\_
- c. On what interval is  $f$  constant? \_\_\_\_\_
- b. Values of  $x$  such that  $f(x) > 0$  \_\_\_\_\_
- c. Intervals on which  $f$  is decreasing. \_\_\_\_\_
- d. What are the zeros of  $f$ ? \_\_\_\_\_
- e. What is  $f(2)$ ? \_\_\_\_\_
- f. What is the relative minimum value of  $f$ ? \_\_\_\_\_

Multiple Choice Key  
M115 09S – Exam 1

1. B
2. A
3. A
4. C
5. A
6. B
7. A
8. D
9. B
10. E
11. C
12. C
13. E
14. E