

# Modern College Of Business and Science

## APPLIED MATHEMATICS

### SYLLABUS AND PRACTICE QUESTIONS FOR APPLIED MATHEMATICS PLACEMENT TEST

*The topics covered in Applied Mathematics are Basic Algebra, commercial Mathematics and some important concepts of related probability and Statistics. This course also includes the real life and business related application problems.*

#### Syllabus

**Equations and Inequalities:** Quadratic Equations, Inequalities and applications, Linear and Non- linear system of Equations, Two Variable Linear Systems and System of Inequalities.

**Functions and graphs:** Introduction to Functions, Analyzing graphs of functions, Library of Parent Functions and Transformation, Combinations of Functions and Composition of Functions.

**Quadratic, Exponential and Logarithmic Functions and Models:** Quadratic functions, Exponential functions and their graphs, Logarithmic functions and their graphs, Properties of Logarithms and Exponential and Logarithmic Equations.

**Concepts of Basic Statistics and Probability:** Basic Concepts of Descriptive Statistics, Measures of central tendency (mean, median, mode), Simple Graphs(bar charts,histogram and pie chart), Basic Probability, Permutations and Combinations.

*These questions are provided to help you review some of the concepts that may be on the placement test for Applied mathematics. These questions are not intended to represent any of the actual test questions.*

*The actual test is for 1 hour and calculators are not allowed.*

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the equation by the zero-factor property.

1)  $x^2 + 10x - 24 = 0$

A) {2, 12}

B) {-2, 12}

C) {-12, 2}

D) {-12, -2}

1) \_\_\_\_\_

Solve the equation using the quadratic formula.

2)  $2x^2 + 12x = -3$

A)  $\left\{ \frac{-6 \pm \sqrt{42}}{2} \right\}$   
C)  $\left\{ \frac{-12 \pm \sqrt{30}}{2} \right\}$

B)  $\left\{ \frac{-6 \pm \sqrt{30}}{4} \right\}$   
D)  $\left\{ \frac{-6 \pm \sqrt{30}}{2} \right\}$

2) \_\_\_\_\_

Solve the problem.

3) The area of a square is numerically 96 more than the perimeter. Find the length of the side.

- A) 288 units      B) 12 units      C) 72 units      D) 48 units

3) \_\_\_\_\_

Solve the quadratic inequality. Write the solution set in interval notation.

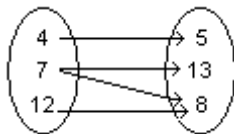
4)  $x^2 - 6x + 8 > 0$

- A)  $(-\infty, 2) \cup (4, \infty)$       B)  $(-\infty, 2)$   
C)  $(4, \infty)$       D)  $(2, 4)$

4) \_\_\_\_\_

Decide whether the relation defines a function.

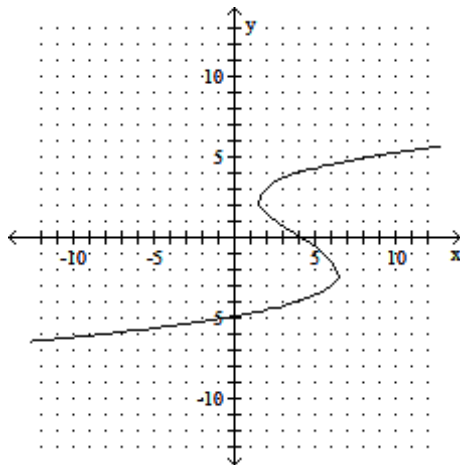
5)



- A) Function      B) Not a function

5) \_\_\_\_\_

6)



- A) Not a function      B) Function

6) \_\_\_\_\_

Give the domain and range of the relation.

7)  $\{(1, 9), (-1, -9), (-7, -5), (6, -9)\}$

7) \_\_\_\_\_

A) domain:  $\{1, 6, 9\}$ ; range:  $\{-9, -7, -5, -1\}$

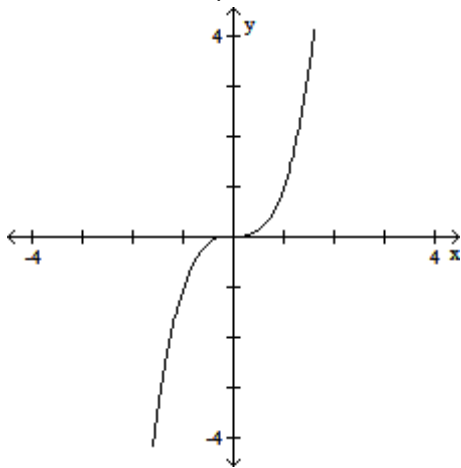
B) domain:  $\{-9, -5, 9\}$ ; range:  $\{-7, -1, 1, 6\}$

C) domain:  $\{-9, -7, -5, -1\}$ ; range:  $\{1, 6, 9\}$

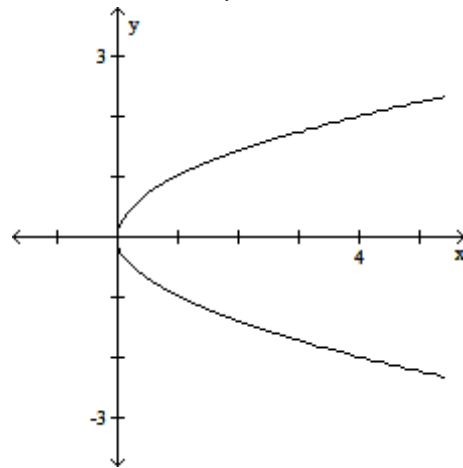
D) domain:  $\{-7, -1, 1, 6\}$ ; range:  $\{-9, -5, 9\}$

Refer to the following graphs to determine an appropriate response.

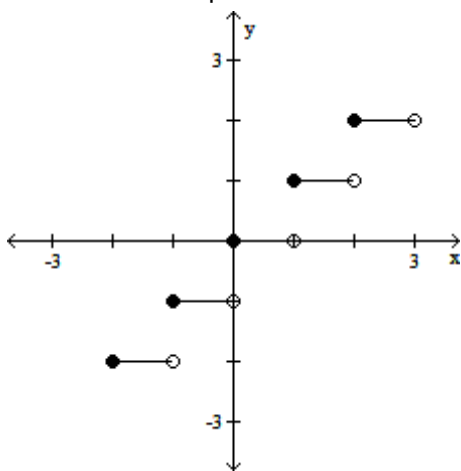
Graph A



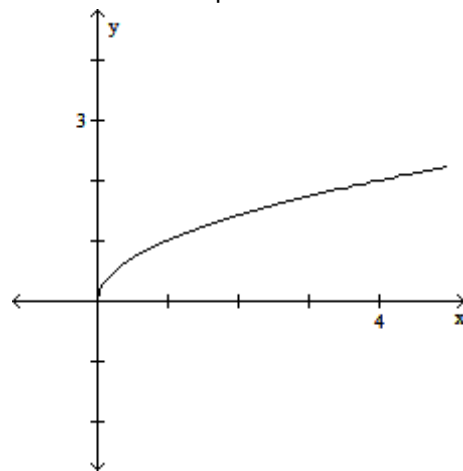
Graph B



Graph C



Graph D



8) Which one is the graph of  $y = x^3$ ? What is its range?

8) \_\_\_\_\_

A) graph D;  $[0, \infty)$

B) graph C;  $[-2, 2]$

C) graph B;  $(-\infty, \infty)$

D) graph A;  $(-\infty, \infty)$

Find the requested value.

9)  $f(-6)$  for  $f(x) = \begin{cases} 2x, & \text{if } x \leq -1 \\ x - 3, & \text{if } x > -1 \end{cases}$

- A) 12                      B) -12                      C) -9                      D) 3

9) \_\_\_\_\_

Evaluate.

10) Find  $(f + g)(-1)$  when  $f(x) = x + 3$  and  $g(x) = x + 6$ .

- A) -5                      B) 7                      C) -11                      D) 1

10) \_\_\_\_\_

Find the requested function value.

11) Find  $(g \circ f)(10)$  when  $f(x) = \frac{x - 1}{3}$  and  $g(x) = 2x + 3$ .

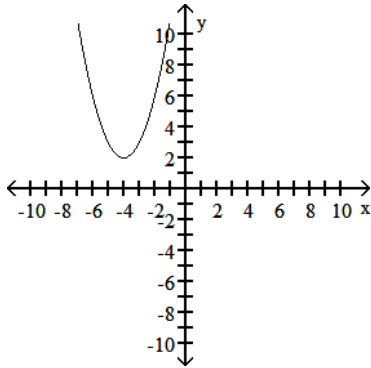
- A) 9                      B)  $\frac{22}{3}$                       C) 69                      D) 15

11) \_\_\_\_\_

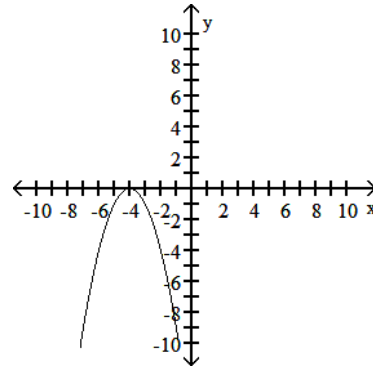
Match the equation to the correct graph.

12)  $y = -(x + 4)^2 + 2$

A)

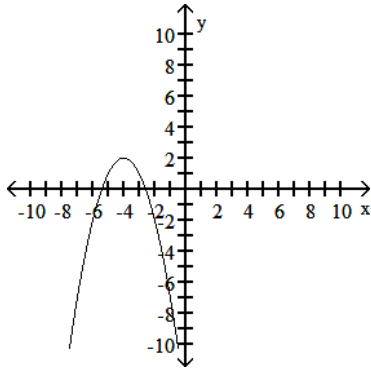


B)

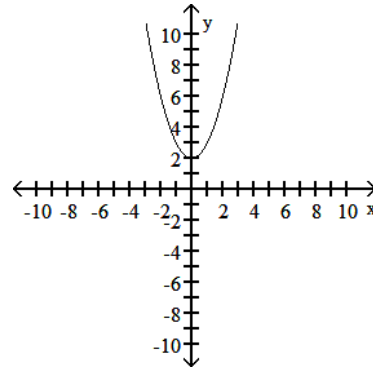


12) \_\_\_\_\_

C)



D)



Find the domain and range of the function.

13)  $f(x) = x^2 + 10x + 24$

- A) Domain:  $[-1, \infty)$ ; Range:  $(-\infty, -5]$                       B) Domain:  $(-\infty, \infty)$ ; Range:  $[-5, \infty)$   
 C) Domain:  $(-\infty, \infty)$ ; Range:  $[-1, \infty)$                       D) Domain:  $[-1, \infty)$ ; Range:  $(-\infty, 0]$

13) \_\_\_\_\_

Find the equation of the axis of symmetry of the parabola.

14)  $f(x) = (x + 4)^2 - 2$

A)  $x = 2$

B)  $y = 2$

C)  $x = 4$

D)  $x = -4$

14) \_\_\_\_\_

Solve the inequality. Write the solution set in interval notation.

15)  $x^2 + 5x - 24 < 0$

A)  $(-\infty, -8) \cup (3, \infty)$

B)  $(-3, 8)$

C)  $(-\infty, -3) \cup (8, \infty)$

D)  $(-8, 3)$

15) \_\_\_\_\_

Solve the equation.

16)  $e^{4x} - 1 = (e^3)^{-x}$

A)  $\{0\}$

B)  $\left\{\frac{4}{5}\right\}$

C)  $\left\{\frac{1}{7}\right\}$

D)  $\{1\}$

16) \_\_\_\_\_

17)  $\left(\frac{1}{3}\right)^{2x+3} = 9^{x-5}$

A)  $\left\{\frac{1}{2}\right\}$

B)  $\left\{\frac{7}{4}\right\}$

C)  $\left\{\frac{13}{2}\right\}$

D)  $\left\{\frac{2}{3}\right\}$

17) \_\_\_\_\_

Evaluate the logarithm.

18)  $\log_7 \frac{1}{49}$

A) 2

B) -2

C) 7

D) -7

18) \_\_\_\_\_

Write an equivalent expression in exponential form.

19)  $\log_{64} 4 = \frac{1}{3}$

A)  $4^{1/3} = 64$

B)  $64^{1/3} = 4$

C)  $\left(\frac{1}{3}\right)^4 = 64$

D)  $4^{64} = 3$

19) \_\_\_\_\_

Solve the equation.

20)  $\log_x 9 = -2$

A)  $\{3\}$

B)  $\left\{-\frac{1}{3}\right\}$

C)  $\{-3\}$

D)  $\left\{\frac{1}{3}\right\}$

20) \_\_\_\_\_

Use the properties of logarithms to solve.

21)  $\log_b(x + 3) + \log_b x = \log_b 54$

A) 3

B) -6, -3

C) 6

D) -6

21) \_\_\_\_\_

22)  $\log(x + 10) - \log(x + 4) = \log x$

A) 6

B) 2

C) 2, -5

D) -5

22) \_\_\_\_\_

Solve the equation and express the solution in exact form.

23)  $\log_9 (x - 4) + \log_9 (x - 4) = 1$

A)  $\{7\}$

C)  $\{\sqrt{17}\}$

B)  $\{-7, 7\}$

D)  $\{-\sqrt{17}, \sqrt{17}\}$

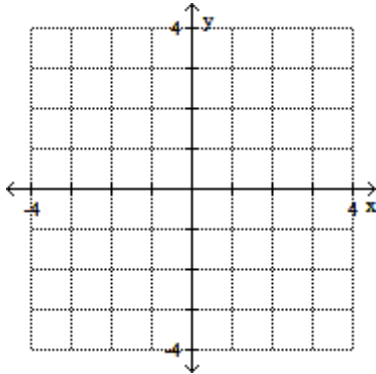
23) \_\_\_\_\_

Graph the solution set of the system of inequalities.

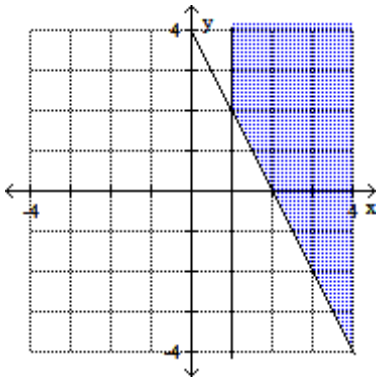
24)  $2x + y \geq 4$

$x - 1 \geq 0$

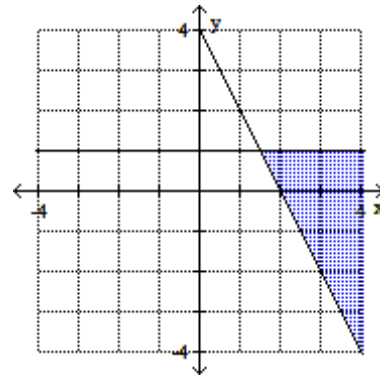
24) \_\_\_\_\_



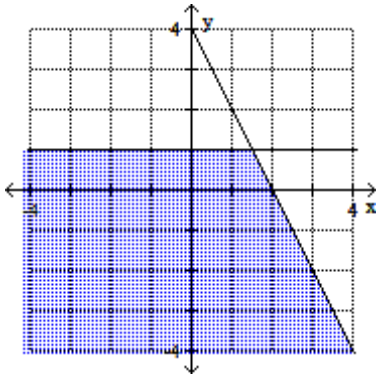
A)



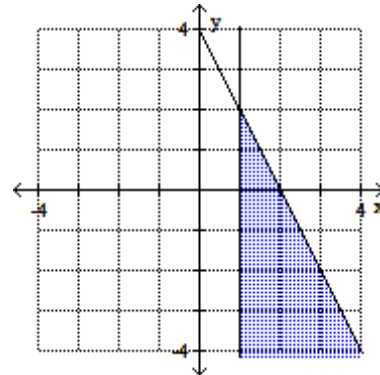
B)



C)

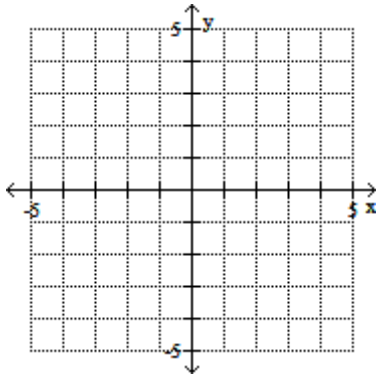


D)

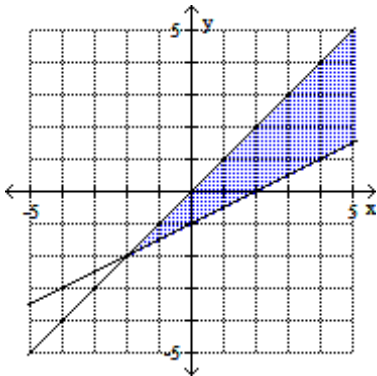


25)  $x + 2y \leq 2$   
 $x + y \geq 0$

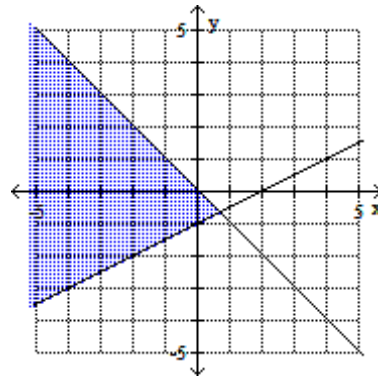
25) \_\_\_\_\_



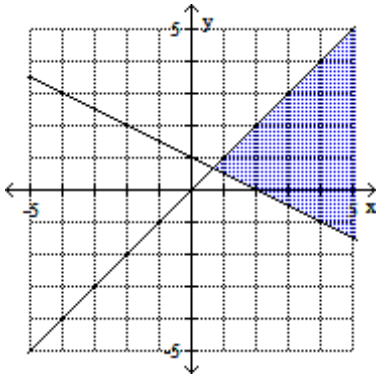
A)



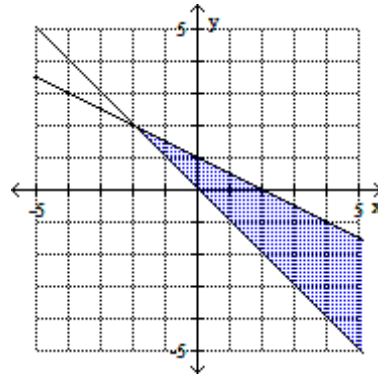
B)



C)



D)



Solve the system by substitution.

26)  $x + y = -1$   
 $x - y = 13$

26) \_\_\_\_\_

A)  $\{(-6, -6)\}$

B)  $\{(5, -6)\}$

C)  $\{(6, -7)\}$

D)  $\emptyset$

Solve the problem.

27) Calculate the mean of a sample for which  $\sum x = 196$  and  $n = 8$ .

27) \_\_\_\_\_

A) 24.5

B) 28

C) 26

D) 25

Find the probability.

- 28) A 6-sided die is rolled. What is the probability of rolling a number less than 2? 28) \_\_\_\_\_  
A)  $\frac{1}{9}$                       B)  $\frac{1}{6}$                       C)  $\frac{5}{6}$                       D)  $\frac{1}{3}$

Solve the problem.

- 29) Calculate the range of the following data set: 29) \_\_\_\_\_

7, 4, 9, 2, 6, 12, 6, 4, 7

- A) 14                      B) 12                      C) 2                      D) 10

- 30) Calculate the variance of a sample for which  $n = 5$ ,  $\sum x^2 = 1320$ ,  $\sum x = 80$ . 30) \_\_\_\_\_  
A) 10.00                      B) 326.00                      C) 3.16                      D) 8.00

- 31) 7 different books are to be arranged on a shelf. How many different arrangements are possible? 31) \_\_\_\_\_  
A) 5040                      B) 7                      C) 720                      D) 2520

Find the domain and range of the function.

- 32)  $f(x) = (x + 4)^2 + 8$  32) \_\_\_\_\_  
A) Domain:  $(-\infty, \infty)$ ; range:  $(-8, \infty)$                       B) Domain:  $(8, \infty)$ ; range:  $(-\infty, \infty)$   
C) Domain:  $(-8, \infty)$ ; range:  $(-\infty, \infty)$                       D) Domain:  $(-\infty, \infty)$ ; range:  $[8, \infty)$

Identify the vertex of the parabola.

- 33)  $y = -3x^2 + 24x - 51$  33) \_\_\_\_\_  
A) (4, -3)                      B) (3, -4)                      C) (-4, 3)                      D) (-3, 4)

Solve the system by substitution.

- 34)  $x + y = 2$  34) \_\_\_\_\_  
 $x - y = 4$   
A)  $\{(3, -1)\}$                       B)  $\{(2, 0)\}$                       C)  $\{(-3, 0)\}$                       D)  $\emptyset$

Solve the system by elimination.

- 35)  $x + 7y = 9$  35) \_\_\_\_\_  
 $5x + 6y = 16$   
A)  $\{(2, 1)\}$                       B)  $\emptyset$                       C)  $\{(-2, 2)\}$                       D)  $\{(1, 2)\}$

Give all solutions of the nonlinear system of equations.

- 36)  $x^2 + y^2 = 41$  36) \_\_\_\_\_  
 $x + y = -9$   
A)  $\{(-4, -5), (-5, -4)\}$                       B)  $\{(4, -5), (5, -4)\}$   
C)  $\{(-4, 5), (-5, 4)\}$                       D)  $\{(4, 5), (5, 4)\}$



Write an equation for the line described. Give your answer in slope-intercept form.

37)  $m = 4$ , through  $(2, -4)$

A)  $y = 5x + 13$

B)  $y = 4x - 12$

C)  $y = 4x - 10$

D)  $y = 4x + 11$

37) \_\_\_\_\_

Find the requested value.

38) Using the given tables, find  $(f \circ g)(3)$

x	11	7	3	5
f(x)	22	14	6	10

x	5	3	6	4
g(x)	9	5	11	7

A) 14

B) 3

C) 5

D) 10

38) \_\_\_\_\_

Compute and simplify the difference quotient  $\frac{f(x+h) - f(x)}{h}$ ,  $h \neq 0$ .

39)  $f(x) = 4x - 9$

A) 9

B) 4

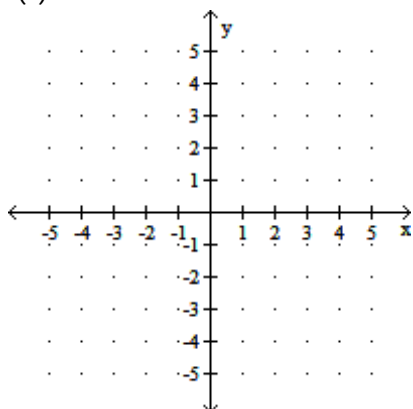
C)  $-9h$

D)  $\frac{9}{4}$

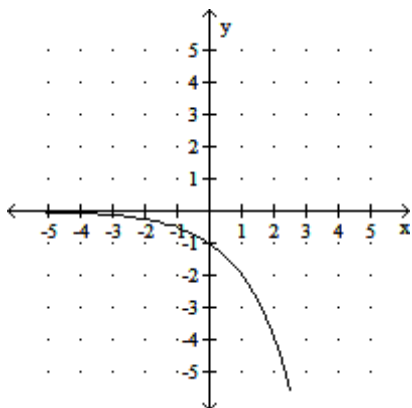
39) \_\_\_\_\_

Graph the exponential function using transformations where appropriate.

40)  $f(x) = -2^x$

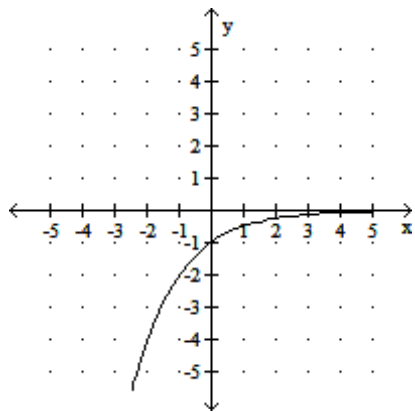


A)

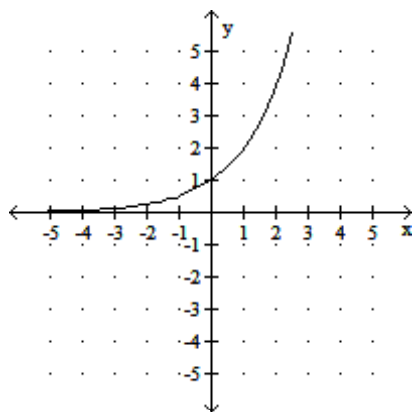


40) \_\_\_\_\_

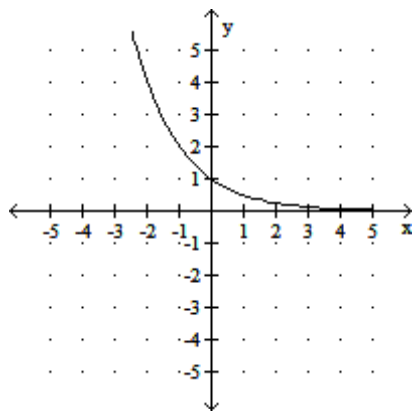
B)



C)



D)



Answer Key

Testname: MAT 20 PRACTICE PLACEMENT

- 1) C
- 2) D
- 3) B
- 4) A
- 5) B
- 6) A
- 7) D
- 8) D
- 9) B
- 10) B
- 11) A
- 12) C
- 13) C
- 14) D
- 15) D
- 16) C
- 17) B
- 18) B
- 19) B
- 20) D
- 21) C
- 22) B
- 23) A
- 24) A
- 25) D
- 26) C
- 27) A
- 28) B
- 29) D
- 30) A
- 31) A
- 32) D
- 33) A
- 34) A
- 35) A
- 36) A
- 37) B
- 38) D
- 39) B
- 40) A