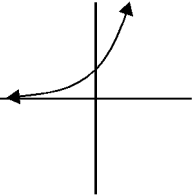
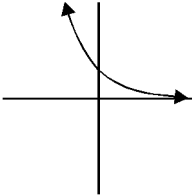
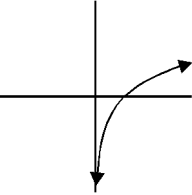
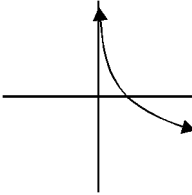


Pre Calc review

Name: \_\_\_\_\_

Date: \_\_\_\_\_

1. Solve:  $\log_2 x = 3 - \log_2(x + 2)$ 
  - A. 2 only
  - B. -4 only
  - C. both 2 and -4
  - D.  $-4 < x < 2$
  - E. no solution
  
2. Solve for  $x$ :  $8x^{3/2} = 27$ 
  - A.  $\frac{4}{9}$
  - B.  $\frac{9}{4}$
  - C.  $\frac{2}{3}$
  - D. 2
  - E. 3
  
3. If  $2^{4x+y} = 1024$ , and  $3^{y-1} = 243$ , then  $x =$  \_\_\_\_\_.
  - A. 2
  - B. 1
  - C. -2
  - D. 4
  - E. 0.75
  
4. A solution of  $2x^{2/3} = 15 - 7x^{1/3}$  lies between:
  - A. 0 and 1
  - B. -2 and -1
  - C. 1 and 2
  - D. 3 and 4
  - E. none of these
  
5. Find  $x$  such that  $125^{x-1} = 25$ .
  - A.  $x = \frac{3}{2}$
  - B.  $x = \frac{1}{3}$
  - C.  $x = \frac{5}{3}$
  - D.  $x = 1$
  - E. none of these

6. Evaluate:  $\log_{10}[\log_3(\log_5 125)]$ 
  - A. 1
  - B. 0
  - C. 2
  - D.  $\emptyset$
  - E. none of these
  
7. If  $4^{2x} + 16 = 17(4^x)$ , then the value of  $x^2 + x + 1$  is:
  - A. 1 only
  - B. 2 only
  - C. 1 or 7
  - D. 0 only
  - E. 7 only
  
8. How many real solutions are there to the equation  $x^2 = 3^x$ ?
  - A. 0
  - B. 1
  - C. 2
  - D. 4
  - E. infinitely many
  
9. Which of the following graphs best represents the shape of the graph  $y = e^x$ ?
  - A. 
  - B. 
  - C. 
  - D. 
  - E. none of these

10.  $2^{\log_4 8}$  is equal to:

- A. 2                      B. 4                      C.  $2\sqrt{2}$   
D. 8                      E. 16

11. Simplify:  $\frac{27^{r-2}}{(3^{r+2})(9^{r-5})}$

- A. 1                      B. 3                      C. 6                      D. 12  
E. none of these

12. The quadratic equation  $x^2 + x + 3 = 0$  has:

- A. two distinct real roots  
B. one real root and one complex root  
C. no real root  
D. equal roots  
E. none of these

13. The sum of the roots of the equation  $x^2 - 4x + 6 = 0$  is:

- A. 2                      B. 10                      C.  $-\frac{2}{3}$                       D.  $\frac{2}{3}$   
E. none of these

14. Solve:  $3x^2 + 6x = 10$

- A.  $\frac{-1 \pm \sqrt{39}}{3}$                       B.  $\frac{-1 \pm \sqrt{19}}{3}$   
C.  $\frac{-3 \pm \sqrt{39}}{3}$                       D.  $\frac{-3 \pm 2\sqrt{19}}{3}$   
E. none of these

15. Give the value of  $a$  in lowest terms:

$$\frac{2a + 7}{a^2 - 2a - 15} - \frac{3a - 4}{a^2 - 7a + 10} = \frac{-a^2}{(a - 5)(a^2 + a - 6)}$$

- A.  $a = -3$                       B.  $a = -1$   
C.  $a = \frac{1}{5}$                       D.  $a = 0$   
E. none of these

16. Find the inverse of the function  $f(x) = x^3 + 1$ .

- A.  $x^{1/3} + 1$                       B.  $(x - 1)^{1/3}$   
C.  $\pm(x - 1)^{1/3}$                       D.  $x^{1/3} + 1$   
E. no inverse exists

17. If  $f(n + 1) = \frac{2f(n) + 1}{2}$  and  $f(1) = 2$ , then  $f(101)$  is equal to:

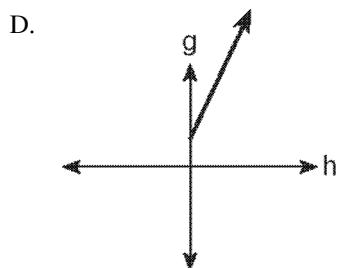
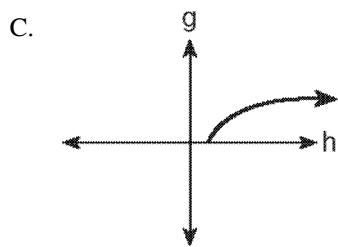
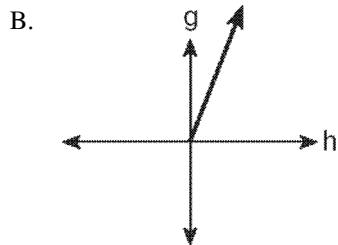
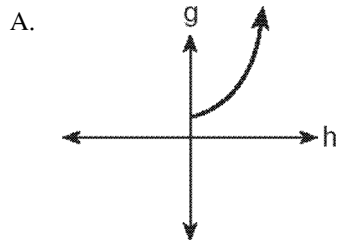
- A. 50                      B. 51                      C. 52                      D. 53  
E. none of these

18. The domain of  $f(x) = \sqrt{\frac{-x}{3-x}}$  is:

- A.  $x \leq 0$  or  $x \geq 3$                       B.  $x \neq 3$   
C.  $0 < x < 3$                       D.  $x > 0$  or  $x \neq 3$   
E.  $x \leq 0$  or  $x \neq 3$



28. The cells of a particular organism increase logarithmically. If  $g$  represents cell growth and  $h$  represents time, in hours, which graph best represents the growth pattern of the cells of this organism?



29. Which equation models the data in the accompanying table?

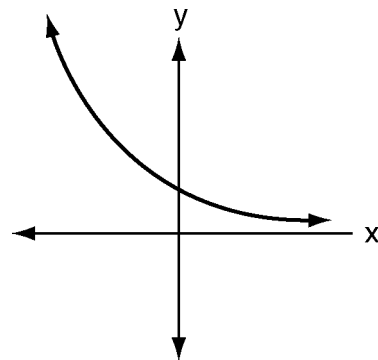
Time in hours, $x$	0	1	2	3	4	5	6
Population, $y$	5	10	20	40	80	160	320

- A.  $y = 2x + 5$                       B.  $y = 2^x$   
 C.  $y = 2x$                               D.  $y = 5(2^x)$

30. The height,  $f(x)$ , of a bouncing ball after  $x$  bounces is represented by  $f(x) = 80(0.5)^x$ . How many times higher is the first bounce than the fourth bounce?

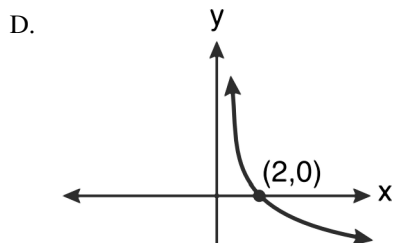
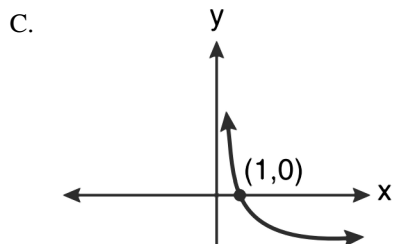
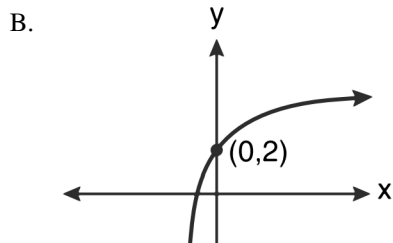
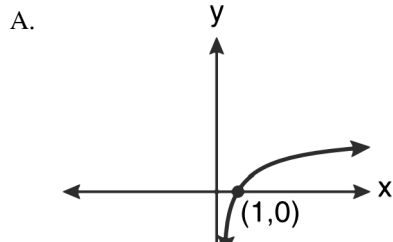
- A. 8                      B. 2                      C. 16                      D. 4

31. Which equation best represents the accompanying graph?



- A.  $y = 2^x$                               B.  $y = x^2 + 2$   
 C.  $y = 2^{-x}$                               D.  $y = -2^x$

32. Which graph represents the function  $\log_2 x = y$ ?



33. The table below shows the number of new stores in a coffee shop chain that opened during the years 1986 through 1994.

Year	Number of New Stores
1986	14
1987	27
1988	48
1989	80
1990	110
1991	153
1992	261
1993	403
1994	681

Using  $x = 1$  to represent the year 1986 and  $y$  to represent the number of new stores, write the exponential regression equation for these data. Round all values to the *nearest thousandth*.

34. As shown in the table below, a person's target heart rate during exercise changes as the person gets older.

Age (years)	Target Heart Rate (beats per minute)
20	135
25	132
30	129
35	125
40	122
45	119
50	115

Which value represents the linear correlation coefficient, rounded to the *nearest thousandth*, between a person's age, in years, and that person's target heart rate, in beats per minute?

- A.  $-0.999$                       B.  $-0.664$   
 C.  $0.998$                          D.  $1.503$

35. The number of houses in Central Village, New York, grows every year according to the function  $H(t) = 540(1.039)^t$ , where  $H$  represents the number of houses, and  $t$  represents the number of years since January 1995. A civil engineering firm has suggested that a new, larger well must be built by the village to supply its water when the number of houses exceeds 1,000. During which year will this first happen?

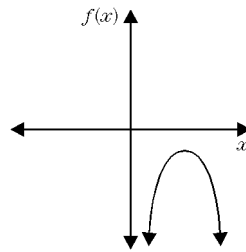
36. Given the equation  $x^2 - 8x + 15 = 0$ . Which statement is true?

- A. The sum of the roots is 15.
- B. Both roots are greater than zero.
- C. One root is less than zero and the other root is greater than zero.
- D. One root is zero and the other root is greater than zero.

37. If the discriminant of an equation is 10, then the roots are

- A. real, rational, and unequal
- B. real, irrational, and unequal
- C. real, rational, and equal
- D. imaginary

38. The accompanying diagram shows a sketch of a quadratic function,  $f(x)$ . What is the nature of the roots of the quadratic equation  $f(x) = 0$ ?



- A. imaginary
- B. real, rational, and equal
- C. real, rational, and unequal
- D. real, irrational, and unequal

39. Find the positive root of the equation  $4x^2 - 36 = 0$ .

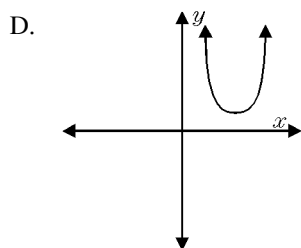
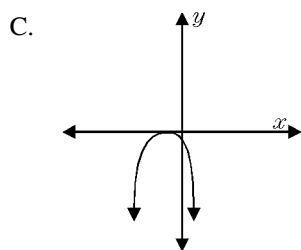
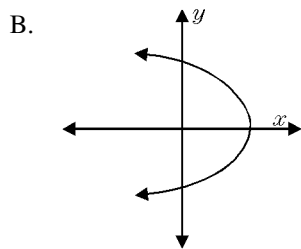
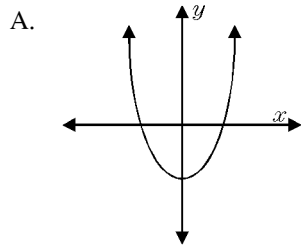
40. Which quadratic equation has roots of  $(1 + 3i)$  and  $(1 - 3i)$ ?

- A.  $x^2 + 2x - 10 = 0$
- B.  $x^2 - 2x + 10 = 0$
- C.  $x^2 + 2x - 8 = 0$
- D.  $x^2 - 2x - 8 = 0$

41. In the equation  $ax^2 + bx + c = 0$ ,  $a$ ,  $b$ , and  $c$  are real numbers. If  $\frac{1}{3} - \frac{2}{3}i$  is a root of this equation, the sum of the roots is

- A. 1
- B.  $-\frac{2}{3}$
- C.  $\frac{2}{3}$
- D. 0

42. Which diagram could represent the graph of an equation with imaginary roots?



43. What is the solution set of the equation  $x^2 + 9 = 0$ ?

- A.  $\{3, -3\}$                       B.  $\{3i, -3i\}$   
 C.  $\{-3, -3i\}$                     D.  $\{\}$

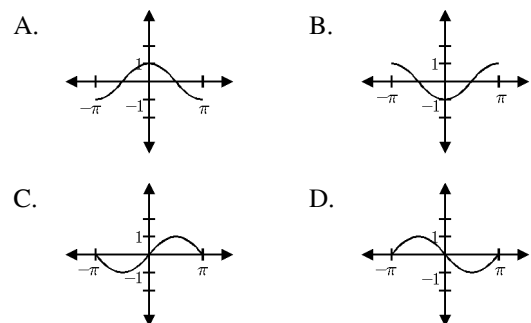
44. By which transformation can the set representing the inverse of a function be found?

- A. reflection in the origin  
 B. reflection in the line  $y = x$   
 C. rotation of  $90^\circ$  about the origin  
 D. reflection in the  $y$ -axis

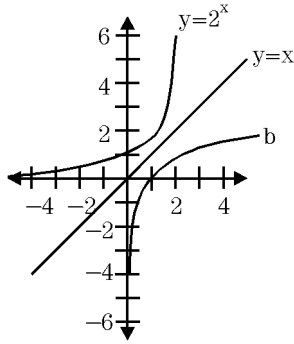
45. If the graph of the equation  $y = 3^x$  is reflected in the  $x$ -axis, the equation of the reflection is

- A.  $y = 3^{-x}$                       B.  $y = -(3^x)$   
 C.  $y = \log_x 3$                     D.  $y = x^3$

46. For the interval  $-\pi \leq x \leq \pi$ , which graph would represent the image of the equation  $y = \cos x$  after a reflection in the  $y$ -axis?



47. In the diagram shown, figure  $b$  is the reflection of  $y = 2^x$  in the line  $y = x$ .



Which is an expression for the equation of figure  $b$ ?

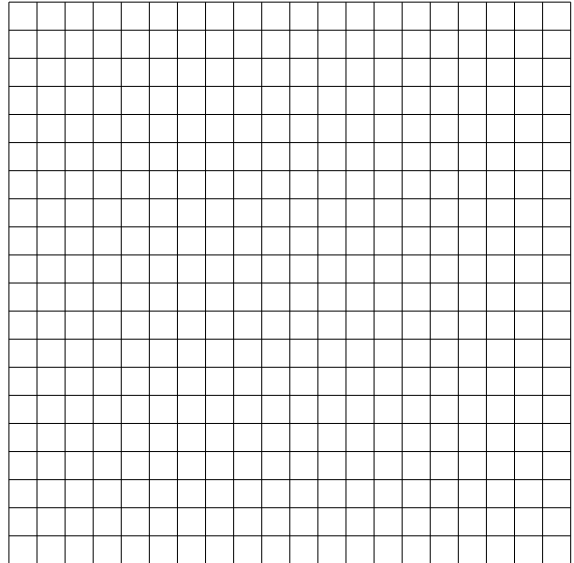
- A.  $y = (-2)^x$                       B.  $y = 2^{-x}$   
 C.  $y = \log_2 x$                       D.  $y = \log_x 2$
48. Which type of symmetry does the equation  $y = \cos x$  have?
- A. line symmetry with respect to the  $x$ -axis  
 B. line symmetry with respect to  $y = x$   
 C. point symmetry with respect to the origin  
 D. point symmetry with respect to  $(\frac{\pi}{2}, 0)$

49. a) Given:  $\log_b 2 = 0.6931$   
 $\log_b 3 = 1.0986$   
 Find  $\log_b \sqrt{12}$   
 b) Solve for  $x$ :  $\log_8(x - 6) + \log_8(x + 6) = 2$

50. Two different tests were designed to measure understanding of a topic. The two tests were given to ten students with the following results:

Test $x$	75	78	88	92	95	67	58	72	74	81
Test $y$	81	73	85	88	89	73	66	75	70	78

Construct a scatter plot for these scores, and then write an equation for the line of best fit (round slope and intercept to the *nearest hundredth*).



Find the correlation coefficient.

Predict the score, to the nearest integer, on test  $y$  for a student who scored 87 on test  $x$ .



51. In a mathematics class of ten students, the teacher wanted to determine how a homework grade influenced a student's performance on the subsequent test. The homework grade and subsequent test grade for each student are given in the accompanying table.

Homework Grade (x)	Test Grade (y)
94	98
95	94
92	95
87	89
82	85
80	78
75	73
65	67
50	45
20	40

- a) Give the equation of the linear regression line for this set of data.
- b) A new student comes to the class and earns a homework grade of 78. Based on the equation in part *a*, what grade would the teacher predict the student would receive on the subsequent test, to the *nearest integer*?

52. A box containing 1,000 coins is shaken, and the coins are emptied onto a table. Only the coins that land heads up are returned to the box, and then the process is repeated. The accompanying table shows the number of trials and the number of coins returned to the box after each trial.

Trial	0	1	3	4	6
Coins Returned	1,000	610	220	132	45

Write an exponential regression equation, rounding the calculated values to the *nearest ten-thousandth*.

Use the equation to predict how many coins would be returned to the box after the eighth trial.

Pre Calc review      05/23/2013

1.  
Answer:      A
2.  
Answer:      B
3.  
Answer:      B
4.  
Answer:      D
5.  
Answer:      C
6.  
Answer:      B
7.  
Answer:      C
8.  
Answer:      B
9.  
Answer:      A
10.  
Answer:      C
11.  
Answer:      E
12.  
Answer:      C
13.  
Answer:      E
14.  
Answer:      C
15.  
Answer:      E
16.  
Answer:      B
17.  
Answer:      C
18.  
Answer:      A
19.  
Answer:      A

20.  
Answer:      B
21.  
Answer:      C
22.  
Answer:      C
23.  
Answer:      9
24.  
Answer:      1
25.  
Answer:      C
26.  
Answer:      C
27.  
Answer:      B
28.  
Answer:      C
29.  
Answer:      D
30.  
Answer:      A
31.  
Answer:      C
32.  
Answer:      A
33.  
Answer:       $y = (10.596)(1.586)^x$
34.  
Answer:      A
35.  
Answer:      2011
36.  
Answer:      B
37.  
Answer:      B
38.  
Answer:      A
39.  
Answer:      3

40.  
Answer: B
41.  
Answer: C
42.  
Answer: D
43.  
Answer: B
44.  
Answer: B
45.  
Answer: B
46.  
Answer: A
47.  
Answer: C
48.  
Answer: D
49.  
Answer: 1.2424; 10
50.  
Answer:  $y = 0.62x + 29.18$ ,  $r = 0.92$ , and 83
51.  
Answer:  $y = 0.8344648562x + 14.64960064$ ; 80
- 52.