

Honors Algebra 2 Final Review

Name _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Form a polynomial whose zeros and degree are given.

1) Zeros: $-1, 1, -2$; degree 3

1) $x^3 - 5x^2 - 2$

For the polynomial, list each real zero and its multiplicity. Determine whether the graph crosses or touches the x-axis at each x-intercept.

2) $f(x) = 5(x^2 + 1)(x - 2)^2$

2) _____

Use the x-intercepts to find the intervals on which the graph of f is above and below the x-axis.

3) $f(x) = (x - 2)^2(x + 3)^2$

3) _____

Solve the problem.

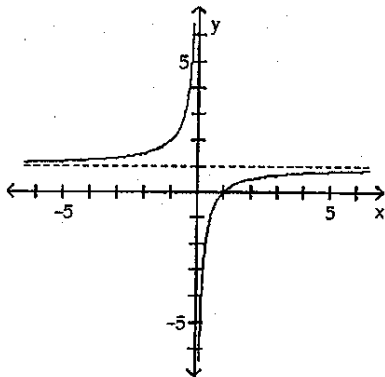
4) Find the vertical asymptote(s) and/or hole(s) for $R(x) = \frac{x^2 + x - 72}{x^2 - x - 56}$

4) _____

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

5) Decide which of the rational functions might have the given graph.

5)



A) $f(x) = 1 - x$

B) $f(x) = 1 - \frac{1}{x}$

C) $f(x) = \frac{1}{x} - 1$

D) $f(x) = 1 + \frac{1}{x}$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Give the maximum number of zeros the polynomial function may have. Use Descartes's Rule of Signs to determine how many positive and how many negative zeros it may have.

6) $f(x) = -4x^9 + x^5 - x^2 + 6$

6) _____

List the potential rational zeros of the polynomial function. Do not find the zeros.

7) $f(x) = 6x^4 + 3x^3 - 2x^2 + 2$

7) _____

Find all of the real zeros of the polynomial function, then use the real zeros to factor f over the real numbers.

8) $f(x) = x^3 + 2x^2 - 5x - 6$

8) _____

Solve the equation in the real number system.

9) $2x^4 - 2x^3 + x^2 - 5x - 10 = 0$

9) _____

Form a polynomial $f(x)$ with real coefficients having the given degree and zeros.

10) Degree: 3; zeros: -2 and $3+i$.

10) _____

Use the given zero to find the remaining zeros of the function.

11) $f(x) = x^3 - 2x^2 - 11x + 52$; zero: -4

11) _____

Find the complex zeros of the polynomial function.

12) $f(x) = 2x^4 - 2x^3 + x^2 - 5x - 10$

12) _____

Find the equation of the parabola described.

13) Vertex at $(9, -4)$; focus at $(9, -6)$

13) _____

Solve the system.

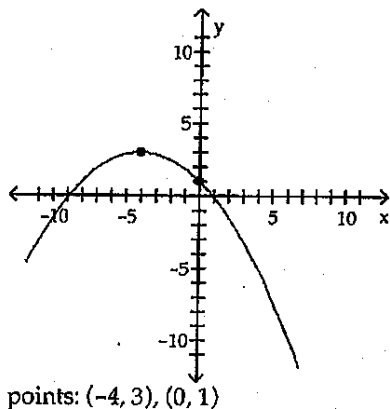
14) A searchlight is shaped like a paraboloid of revolution. If the light source is located 2 feet from the base along the axis of symmetry and the opening is 8 feet across, how deep should the searchlight be?

14) _____

Write an equation for the parabola.

15)

15)



Find an equation for the ellipse.

16) Foci $(\pm 6, 0)$; y -intercepts are ± 3

16) _____

Discuss the equation; that is, find the center, foci, and vertices of the ellipse.

17) $2x^2 + 3y^2 - 16x + 36y + 134 = 0$

17) _____

Find the asymptotes of the hyperbola.

18) $\frac{(x+2)^2}{4} - \frac{(y-3)^2}{25} = 1$

18) _____

Find the center, transverse axis, vertices, foci, and asymptotes of the hyperbola.

19) $x^2 - 4y^2 + 8x + 24y - 24 = 0$

19) _____

Solve the system.

20)

$$\begin{cases} 2x^2 + y^2 = 17 \\ 3x^2 - 2y^2 = -6 \end{cases}$$

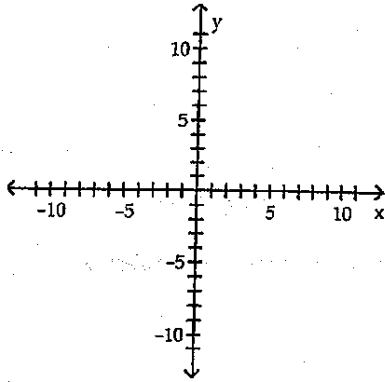
20) _____

Graph the system of inequalities.

21)

$$\begin{cases} x^2 + y^2 \leq 25 \\ -2x + 2y \leq -4 \end{cases}$$

21) _____



Find the indicated composite for the pair of functions.

22) $(f \circ g)(x)$: $f(x) = \frac{2}{x-8}$, $g(x) = \frac{3}{8x}$

22) _____

For the given functions f and g , find the requested composite function value.

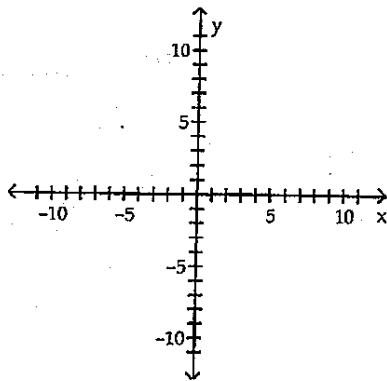
23) Given $f(x) = \frac{x-6}{x}$ and $g(x) = x^2 + 9$, find $(g \circ f)(-2)$.

23) _____

Graph the function as a solid line or curve and its inverse as a dashed line or curve on the same axes.

24) $f(x) = \sqrt{x+5}$

24) _____



If the following defines a one-to-one function, find the inverse.

25) $f(x) = 7x + 4$

25) _____

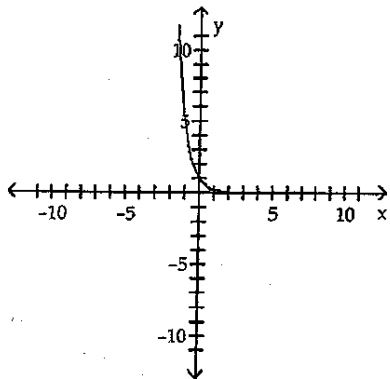


MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

The graph of an exponential function is given. Match the graph to one of the following functions.

26)

26)



A) $f(x) = 5^x$

B) $f(x) = -5^x$

C) $f(x) = -5^{-x}$

D) $f(x) = 5^{-x}$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Solve the equation. Round to the nearest hundredth.

27) $2^{7-3x} = \frac{1}{4}$

27) _____

Change the exponential expression to an equivalent expression involving a logarithm.

28) $e^x = 23$

28) _____

Change the logarithmic expression to an equivalent expression involving an exponent.

29) $\log_3 x = 2$

29) _____

Find the exact value of the logarithmic expression.

30) $\log_6 \frac{1}{36}$

30) _____

31) $\log_6 \sqrt{6}$

31) _____

Find the domain of the function.

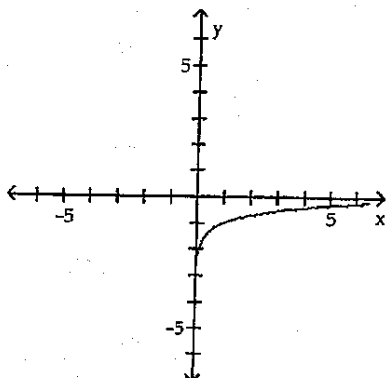
32) $f(x) = \log_{10}(x^2 - 8x + 15)$

32) _____

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

The graph of a logarithmic function is shown. Select the function which matches the graph.

33)



33)

A) $y = 1 - \log(x)$

B) $y = \log(x - 1)$

C) $y = \log(x) - 1$

D) $y = \log(1 - x)$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Solve the equation. Round to the nearest hundredth.

34) $\log_x \left(\frac{1}{25} \right) = 2$

34) _____

Solve the problem.

35) The formula $D = 7e^{-0.04h}$ can be used to find the number of milligrams D of a certain drug in a patient's bloodstream h hours after the drug has been given. When the number of milligrams reaches 4, the drug is to be given again. What is the time between injections?

35) _____

Use the properties of logarithms to find the exact value of the expression. Do not use a calculator.

36) $\log_4 24 - \log_4 6$

36) _____

Find the value of the expression.

37) Let $\log_b A = 4$ and $\log_b B = -5$. Find $\log_b AB$.

37) _____

38) Let $\log_b A = 3$ and $\log_b B = -6$. Find $\log_b \frac{A}{B}$.

38) _____

Write as the sum and/or difference of logs. Express powers as factors.

39) $\log_{19} \sqrt{\frac{xy}{12}}$

39) _____

40) $\ln \left(\frac{(x+9)(x-2)^{5/3}}{(x-3)^2} \right), \quad x > 2$

40) _____

Express as a single logarithm.

41) $9 \log_c 9 + 7 \log_c 7$

41) _____

42) $18 \log_6 \sqrt[6]{x} + \log_6(18x^8) - \log_6 18$

42) _____

Use the Change-of-Base Formula and a calculator to evaluate the logarithm. Round your answer to three decimal places.

43) $\log_{8.0} 6.8$

43) _____

Solve the equation. Round to the nearest hundredth.

44) $\log(4 + x) - \log(x - 5) = \log 2$

44) _____

Solve the equation. Give the exact answer(s).

45) $\log x + \log(x - 2) = 0$

45) _____

Solve the equation. Round to the nearest hundredth.

46) $4^1 + x = 32x$

46) _____

Solve the equation. Round to the nearest hundredth.

47) $2(2x - 1) = 12$

47) _____

Solve the problem. Round your answer to three decimals.

48) How long will it take for an investment to double in value if it earns 8.5% compounded continuously?

48) _____

Solve the problem.

49) Carla has just inherited a building that is worth \$250,000. The building is in a high demand area, and the value of the building is projected to increase at a rate of 25% per year for the next 4 years. How much more money will she make if she waits four years to sell the building instead of selling now?

49) _____

50) During 1991, 200,000 people visited Rave Amusement Park. During 1997, the number had grown to 834,000. If the number of visitors to the park obeys the law of uninhibited growth, find the exponential growth function that models this data.

50) _____

51) The half-life of silicon-32 is 710 years. If 40 grams is present now, how much will be present in 600 years? (Round your answer to three decimal places.)

51) _____

Find the sum of the sequence.

52)

$$\sum_{k=3}^5 (k^2 + 1)$$

52) _____

Find the n th term and the indicated term of the arithmetic sequence whose initial term, a , and common difference, d , are given.

53) $a = -7$; $d = 4$
 $a_n = ?$; $a_8 = ?$

53) _____

Find the sum of the arithmetic sequence.

54) $-3 + 1 + 5 + 9 + 13 + \dots + (4n - 7)$

54) _____

Solve the problem.

55) A brick staircase has a total of 18 steps. The bottom step requires 134 bricks. Each successive step requires 5 less bricks than the prior one. How many bricks are required to build the staircase?

55) _____

56) A new piece of equipment cost a company \$63,000. Each year, for tax purposes, the company depreciates the value by 25%. What value should the company give the equipment after 6 years? 56) _____

57) A pendulum bob swings through an arc 50 inches long on its first swing. Each swing thereafter, it swings only 76% as far as on the previous swing. What is the length of the arc after 11 swings? Round your answer to two decimal places, if necessary. 57) _____

Use a formula to find the sum. Round your answer to two decimal places, if necessary.

58) $3 - 9 + 27 - 81 + 243 - \dots + 3 \cdot (-3)^{13}$ 58) _____

Find the sum of the infinite geometric series.

59) $2 - \frac{1}{2} + \frac{1}{8} - \dots$ 59) _____

60) A ball is dropped from a height of 50 feet. It always rebounds 80% of its previous height. How far will the ball have traveled in total before coming to a stop. Assume the ball just drops up and down only. 60) _____

Find the indicated coefficient or term.

61) The coefficient of x in the expansion of $(2x + 7)^3$ 61) _____

62) The 5th term in the expansion of $(2x + 4)^5$ 62) _____

Expand the expression using the Binomial Theorem.

63) $(3x^2 - 2)^3$ 63) _____

Solve the problem.

64) Lisa has 4 skirts, 7 blouses, and 3 jackets. How many 3-piece outfits can she put together assuming any piece goes with any other? 64) _____

65) How many 9-symbol codes can be formed using 3 different symbols? Repeated symbols are allowed. 65) _____

66) In how many ways can Linda arrange 5 of her 8 new CDs into 5 available slots in her CD holder? 66) _____

67) In how many ways can a committee of three men and four women be formed from a group of 11 men and 11 women? 67) _____

68) How many different ways can 7 balls be pulled out of an urn if 3 are white, 2 are blue, and 2 are red? 68) _____

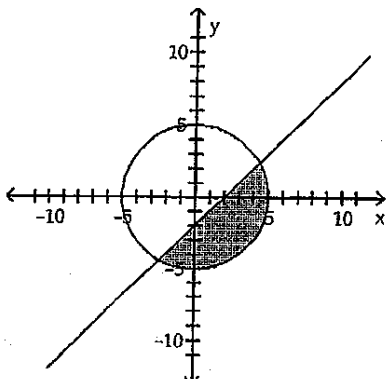
69) A club elects a president, vice-president, and treasurer. How many sets of officers are possible if there are 11 members and any member can be elected to each position? No person can hold more than one office. 69) _____

- 70) A bag contains 8 marbles. 4 are red, 3 are blue, and 1 is white. What is the probability of drawing two marbles that are both red? What is the probability of drawing one red and one blue? Assume you draw two at a time in each case. Answers as a fraction in lowest terms. 70) _____
- 71) The weather forecaster reports a 30% chance of rain on Monday and 40% on Tuesday. Assuming the events are independent of each other, what is the probability that you will not get any rain on either day? 71) _____
- 72) You estimate that your chances of getting an A on the final are 60%. If you don't get an "A" you estimate your chances of an A for the course are only at 10%. If you get an A you figure your chances high at 80%. What is the probability that you will get an A for the class? 72) _____
- 73) You take a short 4 question multiple choice quiz. There are 5 choices per question and only one is correct. What is the probability that you will get at least 3 correct, if you simply guess on each question? Answer as a percent to the nearest hundredth. 73) _____
- 74) For the following digits are randomly generated from 3 to 8. Determine the mean, median, variance and standard deviation: 5 6 7 7 8 4 3 5 6 7 6 5 4 5 5 5 6 3 3 74) _____
- 75) The test scores in a high school math class are distributed normally. On a recent test 36 students took the test and the mean score was 78 with a standard deviation of 10. Answer each: 75) _____
- A. The number of scores at or above 90?
- B. The number of students passing with a 60 or better?
- C. The number of scores in the 70s?
- 76) Battery lifetime is normally distributed for large samples. The mean lifetime is 500 days and the standard deviation is 61 days. What percent of batteries have lifetimes longer than 561 days? 76) _____

Answer Key

Testname: FINAL REVIEW 2017

- 1) $f(x) = x^3 + 2x^2 - x - 2$ for $a = 1$
- 2) 2, multiplicity 2, touches x-axis
- 3) above the x-axis: $(-\infty, -3), (-3, 2), (2, \infty)$
below the x-axis: no intervals
- 4) vertical asymptote: $x = -7$; hole at $(8, \frac{17}{15})$
- 5) B
- 6) 9; 3 or 1 positive zeros; 2 or 0 negative zeros
- 7) $\pm \frac{1}{6}, \pm \frac{1}{3}, \pm \frac{1}{2}, \pm \frac{2}{3}, \pm 1, \pm 2$
- 8) -3, -1, 2; $f(x) = (x + 3)(x + 1)(x - 2)$
- 9) $[-1, 2]$
- 10) $f(x) = x^3 - 4x^2 - 2x + 20$
- 11) $3 + 2i, 3 - 2i$
- 12) $-1, 2, \frac{\sqrt{10}}{2}i, -\frac{\sqrt{10}}{2}i$
- 13) $(x - 9)^2 = -8(y + 4)$
- 14) 2 feet
- 15) $(x + 4)^2 = -8(y - 3)$
- 16) $\frac{x^2}{45} + \frac{y^2}{9} = 1$
- 17) $\frac{(x - 4)^2}{3} + \frac{(y + 6)^2}{2} = 1$
center: $(4, -6)$; foci: $(5, -6), (3, -6)$; vertices: $(5.7, -6), (2.3, -6)$
- 18) $y - 3 = \frac{5}{2}(x + 2)$ and $y - 3 = -\frac{5}{2}(x + 2)$
- 19) center at $(-4, 3)$
transverse axis is parallel to x-axis
vertices at $(-6, 3)$ and $(-2, 3)$
foci at $(-4 - \sqrt{5}, 3)$ and $(-4 + \sqrt{5}, 3)$
asymptotes of $y - 3 = -\frac{1}{2}(x + 4)$ and $y - 3 = \frac{1}{2}(x + 4)$
- 20) $x = 2, y = 3; x = 2, y = -3; x = -2, y = 3; x = -2, y = -3$
- 21)



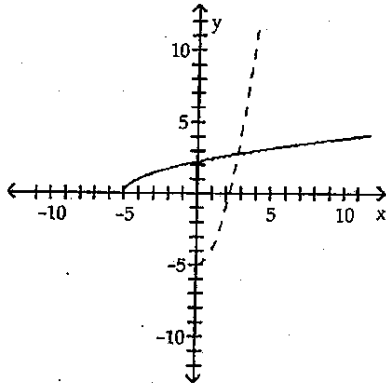
Answer Key

Testname: FINAL REVIEW 2017

22) $\frac{16x}{3-64x}$

23) 25

24)



25) $f^{-1}(x) = \frac{x-4}{7}$

26) D

27) 3

28) $\ln 23 = x$

29) $3^2 = x$

30) -2

31) $\frac{1}{2}$

32) $(-\infty, 3) \cup (5, \infty)$

33) C

34) $\frac{1}{5}$

35) 13.99 hrs

36) 1

37) -1

38) 9

39) $\frac{1}{2} \log_{19} x + \frac{1}{2} \log_{19} y - \frac{1}{2} \log_{19} 12$

40) $\frac{5}{3} \ln(x+9) + \frac{5}{3} \ln(x-2) - \frac{10}{3} \ln(x-3)$

41) $\log_c 9^{977}$

42) $\log_6 x^{11}$

43) 0.922

44) 14

45) $1 + \sqrt{2}$

46) 1.71

47) 2.29

48) 8.155 years

49) \$360,351.56

50) $f(t) = 200,000e^{0.238t}$

Answer Key

Testname: FINAL REVIEW 2017

- 51) 22.267
- 52) 53
- 53) $a_n = -11 + 4n$; $a_8 = 21$
- 54) $n(2n - 5)$
- 55) 1647 bricks
- 56) \$11,213
- 57) 3.21 inches
- 58) -3,587,226
- 59) $\frac{8}{5}$
- 60) 450 feet.
- 61) 294
- 62) 2560x
- 63) $27x^6 - 54x^4 + 36x^2 - 8$
- 64) 84 possible outfits
- 65) 19,683
- 66) 6720
- 67) 54,450
- 68) 210
- 69) 990
- 70) $\frac{3}{14}$ and $\frac{3}{7}$
- 71) 42%
- 72) 48%
- 73) 2.72%
- 74) mean = 5.25, median = 5, mode = 5, Variance 1 8875, Standard Deviation = 1.37
- 75) A. 4 B. 35 C. 13
- 76) 15.87%

