Name: _____ Class: _____ Date: _____ ID: A

Honors Algebra II Final Review

How can you represent the system of equations with a matrix?

____ 1. $\begin{cases} -4x - 10y + 5z = 4 \\ 14x - 5y - 7z = 7 \\ 10x + 14y + 5z = -5 \end{cases}$

a. $\left[\begin{array}{ccc|c} -4 & -10 & 7 & -4 \\ 14 & -5 & -7 & -7 \\ 10 & 14 & 5 & -5 \end{array}\right]$

c. $\left[\begin{array}{ccc|c} -4 & -10 & 7 & 4 \\ 14 & -5 & -7 & 7 \\ 10 & 14 & 5 & -5 \end{array}\right]$

b. $\left[\begin{array}{cc|c} 10 & 14 & -4 \\ 14 & -5 & -10 \\ 5 & -7 & 7 \\ -5 & 7 & 4 \end{array}\right]$

d. $\left[\begin{array}{cc|c} 10 & 14 & -4 \\ 14 & -5 & -10 \\ 5 & -7 & 7 \\ -5 & -7 & -4 \end{array}\right]$

____ 2. A biologist took a count of the number of migrating waterfowl at a particular lake, and recounted the lake's population of waterfowl on each of the next six weeks.

Week	0	1	2	3	4	5	6
Population	585	582	629	726	873	1,070	1,317

Find a quadratic function that models the data as a function of x, the number of weeks. Use the model to estimate the number of waterfowl at the lake on week 8.

a. $P(x) = 25x^2 - 28x + 585$; 1,614 waterfowl

c. $P(x) = 25x^2 - 28x + 585$; 1,961 waterfowl

b. $P(x) = 30x^2 + 28x + 535$; 2,679 waterfowl

d. $P(x) = 30x^2 + 28x + 535$; 2,201 waterfowl

Consider the leading term of each polynomial function. What is the end behavior of the graph?

____ 3. $2x^3 + 5x$

a. The leading term is $2x^3$. Since n is odd and a is positive, the end behavior is up and up.

b. The leading term is $2x^3$. Since n is odd and a is positive, the end behavior is up and down.

c. The leading term is $2x^3$. Since n is odd and a is positive, the end behavior is down and down.

d. The leading term is $2x^3$. Since n is odd and a is positive, the end behavior is down and up.

____ 4. Is $(x-2)$ a factor of $P(x) = x^3 + 2x^2 - 6x - 4$? If it is, write $P(x)$ as a product of two factors.

a. yes:
$P(x) = (x+2)(x^2+4x+2)$

b. yes:
$P(x) = (x-2)(x^2+4x+2)$

c. yes:
$P(x) = (x-2)(x^2-4x+2)$

d. $(x-2)$ is not a factor of $P(x)$

What is the simplest form of the expression?

____ 5. $\sqrt{20} + \sqrt{45} - \sqrt{5}$

a. $4\sqrt{5}$

b. $6\sqrt{5}$

c. $13\sqrt{5}$

d. $5\sqrt{5}$

What is the simplest form of the number?

____ 6. $25^{-1.5}$

a. $\frac{1}{125}$

b. $\frac{1}{265}$

c. -23.5

d. -37.5

____ 7. $-27^{\frac{2}{3}}$

a. 9

b. 57

c. –28

d. –18

Solve the system.

8. $\begin{cases} 3y = 4x + 7 \\ -4x - 4y = 28 \end{cases}$

9. $\begin{cases} -3x - 3y = 3 \\ x - y = 5 \end{cases}$

10. A jet ski company charges a flat fee of $27.00 plus $2.00 per hour to rent a jet ski. Another company charges a fee of $16.50 plus $3.75 per hour to rent the same jet ski.

Using a graphing calculator, find the number of hours for which the costs are the same. Round your answer to the nearest whole hour.

Solve the system.

11. $\begin{cases} 7x + 2y = 11 \\ 4x - 7y = -10 \end{cases}$

12. $\begin{cases} 0.3x + 0.3y = -4.5 \\ -0.6x - 0.6y = 9 \end{cases}$

What are the solutions of the following systems?

13. $\begin{cases} -x + 2y = 10 \\ -3x + 6y = 11 \end{cases}$

Solve the system of inequalities by graphing.

14. $\begin{cases} y \le -3x - 1 \\ y > 3x - 2 \end{cases}$

Solve the system.

15. $\begin{cases} x + 3y + z = -6 \\ 2x + y + 3z = -4 \\ -3x - 3y - 3z = 6 \end{cases}$

16. Identify the vertex and the axis of symmetry of the graph of the function $y = 2(x + 2)^2 - 4$.

17. Identify the maximum or minimum value and the domain and range of the graph of the function $y = 2(x + 2)^2 - 3$.

18. What steps transform the graph of $y = x^2$ to $y = -(x + 3)^2 + 5$?

19. Suppose a parabola has vertex (–8, –7) and also passes through the point (–7, –4). Write the equation of the parabola in vertex form.

What is the vertex form of the equation?

20. $y = x^2 - 2x + 8$

21. You live near a bridge that goes over a river. The underneath side of the bridge is an arch that can be modeled with the function $y = -0.000495x^2 + 0.619x$ where x and y are in feet. How high above the river is the bridge (the top of the arch)? How long is the section of bridge above the arch?

What is the expression in factored form?

22. $2x^2 + 16x + 30$

23. $3x^2 + 26x + 35$

24. $16x^2 - 25$

What are the solutions of the quadratic equation?

25. $x^2 + 11x = -28$

26. The function $y = -0.018t^2 + 0.56t$ models the height y in feet of your pet frog's jump t seconds after it jumps. How far did the frog jump? How high did it go?

What is the solution of each equation?

27. $108x^2 = 147$

Solve the equation.

28. $x^2 + 18x + 81 = 25$

29. $x^2 - 8x + 16 = 16$

What value completes the square for the expression?

30. $x^2 - 18x$

Solve the quadratic equation by completing the square.

31. $x^2 + 10x + 14 = 0$

Rewrite the equation in vertex form. Name the vertex and *y*-intercept.

32. $y = x^2 - 12x + 34$

Use the Quadratic Formula to solve the equation.

33. $-2x^2 - 5x + 5 = 0$

34. $-4x^2 + x = -4$

Simplify.

35. $\sqrt{-360}$

Simplify the expression.

36. $(2 - 5i) - (3 + 4i)$

37. $(6 - 4i)(-1 + 6i)$

38. $\dfrac{-1 + 3i}{4 - i}$

What are the solutions?

39. $9x^2 + 16 = 0$

What is the solution of the linear-quadratic system of equations?

40. $\begin{cases} y = x^2 + 7x + 13 \\ y = x + 5 \end{cases}$

41. Write $-2x^2(-5x^2 + 4x^3)$ in standard form.

Write the polynomial in factored form.

42. $4x^3 + 8x^2 - 96x$

What are the real or imaginary solutions of each polynomial equation?

43. $x^4 - 40x^2 + 144 = 0$

What are the real or imaginary solutions of the polynomial equation?

44. $x^3 - 8 = 0$

45. Divide $4x^3 + 2x^2 + 3x + 4$ by $x + 4$.

46. Use the Rational Root Theorem to list all possible rational roots of the polynomial equation $x^3 - 6x^2 + 4x + 9 = 0$. Do not find the actual roots.

Find all the zeros of the equation.

47. $x^4 - 6x^2 - 7x - 1 = 0$

Use Pascal's Triangle to expand the binomial.

48. $(s + 2v)^5$

Use the Binomial Theorem to expand the binomial.

49. What is the second term of $(3v + s)^5$?

Find the real-number root.

50. $\sqrt[3]{-\frac{125}{343}}$

What is a simpler form of the radical expression?

51. $\sqrt[4]{81x^{20}y^{8}}$

52. $\sqrt[3]{27x^{15}y^{24}}$

53. The formula for the volume of a sphere is $V = \frac{4}{3}\pi r^3$. Find the radius, to the nearest hundredth, of a sphere with a volume of 15 in.^{3}.

Multiply and simplify if possible.

54. $\sqrt{7x}\left(\sqrt{x} - 7\sqrt{7}\right)$

What is the simplest form of the expression?

55. $\sqrt[3]{108a^{16}b^{9}}$

What is the simplest form of the product?

56. $\sqrt{50x^7y^7} \cdot \sqrt{6xy^4}$

What is the simplest form of the quotient?

57. $\frac{\sqrt[3]{162}}{\sqrt[3]{2}}$

58. $\frac{\sqrt[3]{270x^{20}}}{\sqrt[3]{5x}}$

59. $\frac{\sqrt{90x^{18}}}{\sqrt{2x}}$

What is the simplest form of the radical expression?

60. $2\sqrt[4]{2x} + 6\sqrt[4]{2x}$

What is the product of the radical expression?

61. $\left(7 - \sqrt{2}\right)\left(8 + \sqrt{2}\right)$

62. $\left(5 - \sqrt{2}\right)\left(5 + \sqrt{2}\right)$

How can you write the expression with rationalized denominator?

63. $\dfrac{\sqrt{3} - \sqrt{6}}{\sqrt{3} + \sqrt{6}}$

64. Write the exponential expression $3x^{\frac{3}{8}}$ in radical form.

65. Write $(8a^{-3})^{-\frac{2}{3}}$ in simplest form.

What is the solution of the equation?

66. $\sqrt{x + 10} - 7 = -5$

67. $-10 + \sqrt{x + 8} = -4$

68. $(x + 6)^{\frac{3}{5}} = 8$

69. $5x = \sqrt{10 + 15x}$

70. Let $f(x) = -2x - 7$ and $g(x) = -4x + 3$. Find $(f \circ g)(-5)$.

71. Let $f(x) = x + 2$ and $g(x) = x^2$. Find $\left(g \circ f\right)(-5)$.

What is the inverse of the given relation?

72. $y = 7x^2 - 3$.

73. The half-life of a certain radioactive material is 32 days. An initial amount of the material has a mass of 361 kg. Write an exponential function that models the decay of this material. Find how much radioactive material remains after 5 days. Round your answer to the nearest thousandth.

74. Suppose you invest $1600 at an annual interest rate of 4.6% compounded continuously. How much will you have in the account after 4 years?

Write the equation in logarithmic form.

75. $2^5 = 32$

Evaluate the logarithm.

76. $\log_5 \dfrac{1}{625}$

Write the expression as a single logarithm.

77. $3 \log_b q + 6 \log_b v$

78. $4 \log x - 6 \log (x + 2)$

Expand the logarithmic expression.

79. $\log_3 11p^3$

80. Use the Change of Base Formula to evaluate $\log_4 20$.

Solve the exponential equation.

81. $\frac{1}{16} = 64^{4x-3}$

82. $4^{4x} = 8$

83. Solve $15^{2x} = 36$. Round to the nearest ten-thousandth.

Solve the logarithmic equation. Round to the nearest ten-thousandth if necessary.

84. Solve $\log(4x + 10) = 3$.

Write the expression as a single natural logarithm.

85. $3 \ln x - 2 \ln c$

86. Simplify $\ln e^3$.

87. Solve $\ln(2x - 1) = 8$. Round to the nearest thousandth.

Use natural logarithms to solve the equation. Round to the nearest thousandth.

88. $6e^{4x} - 2 = 3$

89. $2e^{2x+12} = 22$

90. Suppose that x and y vary inversely, and $x = 2$ when $y = 8$. Write the function that models the inverse variation.

Find any points of discontinuity for the rational function.

91. What are the points of discontinuity? Are they all removable?

$$y = \frac{(x + 2)(x - 7)}{x^2 - 5x - 14}$$

92. Describe the vertical asymptote(s) and hole(s) for the graph of $y = \frac{(x + 2)(x + 4)}{(x + 4)(x + 1)}$.

93. Find the horizontal asymptote of the graph of $y = \frac{-4x^6 + 6x + 3}{8x^6 + 9x + 3}$.

Simplify the rational expression. State any restrictions on the variable.

94. $\dfrac{q^2 + 11q + 24}{q^2 - 5q - 24}$

What is the product in simplest form? State any restrictions on the variable.

95. $\dfrac{z^2}{z + 1} \cdot \dfrac{z^2 + 3z + 2}{z^2 + 3z}$

What is the quotient in simplified form? State any restrictions on the variable.

96. $\dfrac{x^2 - 16}{x^2 + 5x + 6} \div \dfrac{x^2 + 5x + 4}{x^2 - 2x - 8}$

Simplify the sum.

97. $\dfrac{7}{a + 8} + \dfrac{7}{a^2 - 64}$

98. $\dfrac{w^2 + 2w - 24}{w^2 + w - 30} + \dfrac{8}{w - 5}$

Simplify the difference.

99. $\dfrac{b^2 - 2b - 8}{b^2 + b - 2} - \dfrac{6}{b - 1}$

100. $\dfrac{a^2 - 2a - 3}{a^2 - 9a + 18} - \dfrac{a^2 - 5a - 6}{a^2 + 9a + 8}$

Simplify the complex fraction.

101. $\dfrac{\dfrac{2}{5t} - \dfrac{3}{3t}}{\dfrac{1}{2t} + \dfrac{1}{2t}}$

102. $\dfrac{\dfrac{n - 6}{n^2 + 11n + 24}}{\dfrac{n + 1}{n + 3}}$

Solve the equation. Check the solution.

103. $\dfrac{-2}{x+4} = \dfrac{4}{x+3}$

104. $\dfrac{6}{x^2-9} - \dfrac{1}{x-3} = 1$

105. $\dfrac{5}{6w} + \dfrac{1}{w} = -4$

106. Write a recursive formula for the sequence 7, 13, 19, 25, 31, ... Then find the next term.

107. Find the 110 term of the sequence −7, 3, 13, 23, ...

108. Find the missing term of the arithmetic sequence 22, ■ , 34, ...

Is the sequence geometric? If so, identify the common ratio.

109. 6, 12, 24, 48, ...

What is the fifth term of the geometric sequence?

110. 5, 15, 45, ...

What is the sum of the finite arithmetic series?

111. $29 + 32 + 35 + 38 + 41 + \ldots + 59$

112. Evaluate the series $\sum_{n=3}^{8} 5n$.

113. Suppose Ruth Ann has 3 routes she can choose from to get from school to the library, and 5 routes from the library to her home. How many routes are there from Ruth Ann's school to her home with a stop at the library?

114. Lynn and Dawn tossed a coin 60 times and got heads 33 times. What is the experimental probability of tossing heads using Lynn and Dawn's results?

115. $\begin{bmatrix} -3 & 0 \\ 5 & -7 \end{bmatrix} + \begin{bmatrix} -4 & 2 \\ -1 & 8 \end{bmatrix}$

Find the values of the variables.

116. $\begin{bmatrix} -8+t & 0 \\ 8 & -12 \end{bmatrix} = \begin{bmatrix} -5 & 0 \\ 8 & -2y-2 \end{bmatrix}$

Find the product.

117. $\begin{bmatrix} 5 & 5 \\ -2 & 3 \end{bmatrix}\begin{bmatrix} -4 & 9 \\ 8 & 7 \end{bmatrix}$

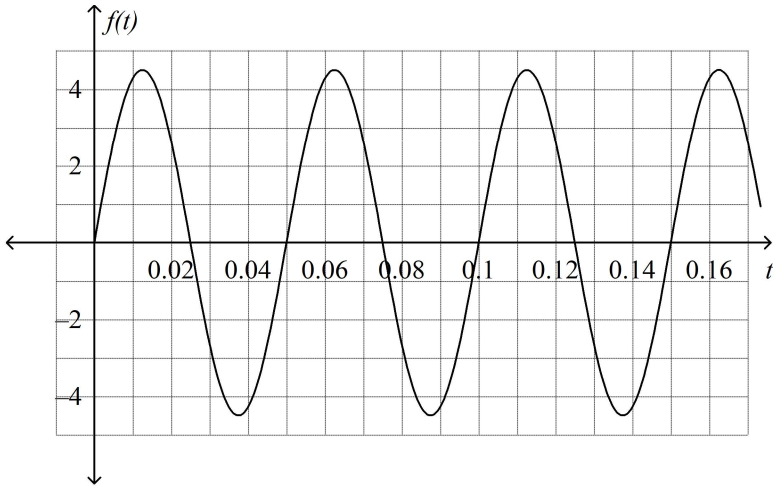
Evaluate the determinant of the matrix.

118. $\begin{bmatrix} -9 & -9 \\ -6 & 6 \end{bmatrix}$

Does the given matrix, A, have an inverse? If it does, what is A^{-1}?

119. $A = \begin{bmatrix} -7 & -25 \\ 2 & 7 \end{bmatrix}$

120. The screen below shows the graph of a sound recorded on an oscilloscope. What are the period and the amplitude? (Each unit on the t-axis equals 0.01 seconds.)



121. Find the measure of an angle between 0º and 360º coterminal with an angle of –110º in standard position.

122. Find the exact value of sin 120º.

123. Find the degree measure of an angle of $\frac{3\pi}{5}$ radians.

124. Find the degree measure of an angle of $-\frac{4\pi}{3}$ radians.

125. Find the exact values of $\cos\left(\frac{3\pi}{4}\text{ radians}\right)$ and $\sin\left(\frac{3\pi}{4}\text{ radians}\right)$.

126. Find the exact value of $\cos\left(-\frac{7\pi}{4} \text{ radians}\right)$.

Sketch one cycle of the sine curve.

127. $y = -3 \sin 4\theta$

Find the period, range, and amplitude of the cosine function.

128. $y = -3\cos 4x$

What is the value of the expression? Do not use a calculator.

129. $\tan\frac{2\pi}{3}$

130. Evaluate $\sec \frac{3\pi}{2}$ to the nearest hundredth. The angle is given in radians.