

ALGEBRA II: FINAL EXAMINATION REVIEW

THE FINAL EXAMINATION WILL BE MULTIPLE CHOICE & SHORT ANSWER SO PLEASE MAKE SURE TO SHOW ALL WORK FOR ALL OF THESE PRACTICE PROBLEMS.

1. To balance a seesaw, the distance d (in feet), a person is from the fulcrum is **inversely** proportional to his or her weight, w in pounds. Roger who weighs 120 pounds, is sitting 6 feet away from the fulcrum. Ellen weighs 108 pounds. How far from the fulcrum must she sit to balance the seesaw.

2. What is the third term of $\sum_{n=4}^{10} (n-1)^2$?

3. Given: $V = \frac{1}{3}\pi r^2 h$ Solve for r .

4. If four roots of $f(x)$ are 3, -2, $4i$, $-4i$, write the polynomial in factored form. What degree is the polynomial? Draw a quick sketch. Include the coordinates of the y -intercept.

5. Solve for x . Show your solution set on a number line and write the solution set as an inequality.

$$|x-9| > 3$$

6. List the domain. Solve for x . $\frac{5x}{x-2} = 7 + \frac{10}{x-2}$

7. If $f(x) = x^3 - 4x^2 - 3x + 12$, solve the inequality $0 < x^3 - 4x^2 - 3x + 12$. Draw a coordinate plane graph & highlight the solution set. Show the solution on a number line. Write the solution set as an inequality.

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8. List the coordinates of the x and y -intercepts of $g(x) = x^2 - 2x - 8$.
List the coordinates of the vertex. Write the equation of the axis of symmetry.
9. \$2500 is deposited in an account paying 7.5% interest, compounded continuously.
Find its value after 5 years. Use a formula.

10. Simplify. No negative exponents in your answer. $\frac{4^{-1}x^3y^{-3} \cdot (x^3y^3)^{-1}}{2^3(xy^{-2})^2 \cdot (8x)^{-3}}$

11. Solve for x . $\log_3(2x+3) - \log_3 4 = \log_3 x$

12. Factor completely. Solve for all real and complex roots. $8x^3 - 125 = 0$

14. $10^{2x-1} + 3 = 8$ Round to the nearest tenth.

15. Solve the following for x .

a. $\log_3 3x = 2$ b. $\log_{64} x = \frac{1}{3}$ c. $x = \sqrt{2x} + 4$

d. $\log_3 2x + \log_3 x = \log_3 8$ e. $6 \ln x = 10$ f. $\sqrt[4]{1-2x} = 2$

g. $x^2 - 9x < 22$

16. $\frac{1}{3}$ is a zero of $3x^3 + 5x^2 - 47x + 15$, factor the remaining polynomial.

17. Perform the indicated operation. Leave answers in terms of i^1 only where i is imaginary. $(1+i)^2 - (7-4i)^2 + i^3$

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18. Solve for x : $|14 - 5x| \geq 8$ Write your solution as an inequality and graph the solution set on a number line.

19. List the domain, zeroes & coordinates of the y -intercept for: $H(x) = \frac{x^2 - 4x - 5}{2x^2 - 5x - 3}$

20. List the domain & range of $f(x) = x^2 - x$. Include a quick sketch.

21. Factor completely: $27x^3 + 64$

22. An Arithmetic sequence has the following properties:

Fifth term: 6 Eleventh term: 36

- List the first 4 terms of the sequence.
- What is the tenth term of the sequence?
- Use a formula to find the 25th term.
- Use a formula to find the sum of the first 25 terms.

23. New farm equipment costs \$260,000. If the equipment depreciates 11% each year, use a formula to determine the value to the nearest \$100 after ten years.

24. Solve for x . $3^{-2} \cdot 9^x = 27^2$

25. Does the infinite geometric series have a sum? Justify. If there is a sum, use a formula to determine it.

$$\sum_{n=0}^{\infty} -4 \left(\frac{1}{4} \right)^n$$

26. Algebraically find the inverse of $y = 2 + \log(x - 1)$

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27. Use algebraic techniques to find the inverse of $y = 3^x$. Graph the function & its inverse on the same set of axes. State how the graphs are related graphically & in terms of their coordinates.

28. Simplify. No negative exponents in answer. $\frac{6e^{-5x}}{2e^{2x}}$

29. The variable z varies jointly with the product of x and y . Use the given values to find an equation that relates the variables.

$$x = -5, y = 2, z = \frac{3}{4}$$

30. Use long division. List the remainder. Write the answer in fractional form.

$$(6x^4 + 2x^3 + 5x^2 + 3x) \div (3x^2 + x - 2)$$

31. Evaluate the expression: $3.2 \ln 8$

32. Expand the expression: $\ln 32x^5y$

33. Graph $f(x) = 2e^{-x} - 3$ No GC. List the PF, the transformations of the PF to get the new function and the coordinates of the y-intercept.

34. State the domain. Solve for x . $\sqrt[3]{x+12} = 5$

35. $2x^{\frac{3}{4}} = 54$

36. What does the discriminant of $2x^2 - x + 8$ tell you about the type of zeros the polynomial has? How would you confirm this by looking at the graph?

37. \$2250 is deposited in an account that pays 6% annual interest, compounded quarterly. Use a formula to find the balance after ten years.

38. Given: $f(x) = x^3 + x^2 - 9x - 9$ If $f(-1) = 0$, factor the remaining polynomial.

39. Perform the indicated operation. i is imaginary. $3i(1-2i)$

40. List the domain. Solve for x . $\sqrt[4]{x+2}+9=14$

41. Describe the nature of the roots. A) $4x^2-12x+9=0$ B)
What will this mean graphically?

42. Evaluate: $\sum_0^5 2n!$

43. List the domain. Solve the equation & check the solution.

$$\frac{8}{2x+4} - \frac{3x+1}{4x^2-16} = \frac{2}{x+2}$$

44. Is the following sequence arithmetic, geometric or neither? If arithmetic, list the common difference. If geometric, list the common ratio. If neither, show why.

5, 15, 45, 125, ... If arithmetic or geometric, compute the sum of the first 23 terms.

45. List the possible Rational Roots. Write the polynomial as a product of linear factors. Use synthetic division to verify.

$$x^4 - 2x^3 - 10x^2 + 14x + 21$$

46. Perform the indicated operation. $(15-10x^3-2x^2+x)-(7x-x^2)$

47. Condense the following expression: $2\log 9 + 5\log \sqrt[3]{x} - \log \frac{1}{3}$

48. Write the approximation in logarithmic form.

a) $10^{0.12} \approx 1.318$ b) $e^{4.183} \approx 65.562$

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49. Graph the function. Identify the PF, list the transformations & the coordinates of one point on the graph.

$$f(x) = 1 + \log_7 x$$

50. Simplify the expression. No calculator. Show work algebraically.

$$\sqrt[3]{270} + 2\sqrt[3]{10}$$

51. Write the equation of $f^{-1}(x)$ for $f(x) = -3x + 5$

52. If $f(g(x)) = g(f(x))$ for two functions $f(x)$ & $g(x)$, then $f(g(28)) = ?$ State the relationship between $f(x)$ & $g(x)$.

53. List the domain and range of the relation. Is the relation a function? Justify.

$$\{(4,1), (7,2), (3,0), (4,-1), (3,2)\}$$

54. Graph the following function. NO GC. List the coordinates of the vertex & the equation of the axis of symmetry. List the coordinates of all zeros. List the minimum or maximum value.

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

55. Solve the system of equations using any algebraic technique.

$$\begin{cases} -9x + 5y = 1 \\ 3x - 2y = 2 \end{cases}$$

56. x and y vary directly. Write an equation that relates x and y using the given values.

$$x = 2, \quad y = 5$$

57. Write the equation of the line that contains the points $(7, -6)$ and $(-10, 15)$. Use point-slope form.

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58. Graph the equation. List the coordinates of the vertex & the transformations of the PF that yield this new function.

$$y = -2|4x - 1| + 16$$

59. Are the lines parallel, perpendicular or the same line? Justify using both slope & y-intercept.

Line 1 contains (1,7) and (-3,-5)

Line 2 contains (-6, -20) and (0, -2)

60. Evaluate using laws of exponents. No calculator. $\left(\frac{16}{81}\right)^{-\frac{3}{4}}$

61. Expand the expression: $\ln \sqrt[4]{\frac{x^2 z}{y^3}}$

62. Evaluate a) $\log_8 92 + \log_5 12 - \ln 6$ b) $e^{-0.417}$.

63. Write the first five terms of the sequence. $a_1 = -5$ $a_n = -2a_{n-1} + n$

64. Evaluate $\sum_{n=1}^{40} \left(\frac{4}{3}n + \frac{2}{3}\right)$.

65. Perform the indicated operation. $(5x + 4)(x^2 - 1) - 3(2 - x^2)$

66. Sketch the graph of the following inequality. $3x - 7y > -21$

67. Solve the equation using your calculator (calc zero). Use your calculator to find the coordinates of the vertex. List the minimum or maximum value. State the domain & range. $5.1x^2 - 0.33x - 0.1 = y$

68. Given: $f(x)$ & $g(x)$ Write and simplify an equation for $h(x)$.

$$f(x) = x^2 + 1 \quad g(x) = 2x - 3$$

$$h(x) = g(x) - f(x)$$

$$h(x) = f(g(x))$$

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69. Perform the indicated operation and simplify.

$$\frac{x-3}{2x^2-17x+21} \div \frac{x^2-x-6}{x-7}$$

70. Use a formula to find the indicated term of the geometric sequence.

$$a_1 = 4, \quad r = \frac{1}{2}, \quad a_{10} = ?$$

71. Use the Remainder Theorem to evaluate the function. State what your answer represents.

$$f(x) = 2x^3 - 3x^2 + x + 1, \quad \text{at } x = -4$$

72. Solve $7x^2 + 70 = 0$

73. Simplify $-3\left(\frac{1}{6}\right)^{-3}$