

Math 65 Final Exam Review Questions
Based on
Intermediate Algebra 3rd ed. by Elayn Martin-Gay
and
Intermediate Algebra 3rd ed. by Hubbard and Robinson

All Math 65 sections will administer a departmental final exam consisting of 40 multiple choice questions. Graphing calculator required sections may use their calculators, as most questions will be graphing calculator neutral. Work will be done on separate scratch paper and will be collected at the end of the exam.

Requirements for showing work are at the discretion of each instructor. All answers will be scored on a Scantron answer sheet. The weight of the final exam score used in determining the students' semester grades will be determined by each instructor.

The following questions are indicative of the type and level of difficulty of the questions on the final exam. The exam is not necessarily a subset of these exact questions.

Please send any questions or comments to Janet Mazarella or Mei-Lan Shaw.

Simplify.

1. $3 + 6(2) \div 4 - 5$

2. $4\left((2 + 4)^2 - |3 - 5|^3\right)$

3. $\frac{4(5-7)^3 - (-6)}{|7-12| \div 2 + 3}$

Evaluate each expression when $m = -2$, $n = 6$, $p = -3$

4. $m(n^2 - p)$

5. $\frac{3m + n |m - 2p|}{m + 3}$

Name each property illustrated.

6. $(5 + y) + 4 = (y + 5) + 4$

7. $3 \cdot \frac{1}{3} = 1$

List the elements of the set $\{5, -\frac{2}{3}, \frac{0}{2}, \frac{8}{2}, \sqrt{9}, 0.3, \sqrt{7}, 1\frac{5}{8}, \frac{3}{0}, -1, \pi\}$ that are elements of each given set.

8. Integers

9. Rational

Write each statement using mathematical symbols.

10. Four times the sum of x and three is equal to the product of three and x

11. Seven less than the quotient of x and two is greater than five

Solve each equation. Give exact answers only. Students should be aware of extraneous roots and remember to delete them from the solution set.

12. $7x - 6 = 3x - 2(x - 6)$

13. $4(y + 2) - 2y = 8(2y - 1)$

14. $\frac{2z-3}{4} - \frac{4-z}{2} = \frac{z+1}{3}$

15. $|2x| + 5 = 7$

16. $\left| \frac{3x-2}{4} \right| = 1$

17. Solve $7x + 3y = 4$ for y

18. Solve $\frac{b+c}{d} - \frac{b}{c} = \frac{5}{c}$ for d

19. Solve $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$ for R_2

Solve each inequality and write the solution set in interval notation.

20. $2(2x + 1) \leq 6x - 8$

21. $-9 < \frac{2x+5}{3} < 3$

22. $|x+6| > 5$

23. $\left| \frac{x}{3} - 2 \right| \leq 8$

Solve each compound inequality and graph the solution set.

24. $3x + 2 \leq 5$ or $7x > 29$

25. $5 - x > 7$ and $2x - 3 \geq -13$

26. Find the slope and the y -intercept of the line $4x + 6y = -3$

Find an equation of the line in standard form (or general form) satisfying the conditions given.

27. Through $(2, -4)$; slope $-\frac{1}{3}$

28. Parallel to $x + 2y = 6$; through $(3, 5)$

29. Through $(-3, 4)$ and $(-2, -3)$

30. Perpendicular to $2x - 3y = 7$; through $(2, 1)$

Solve each system of equations. Students should be familiar with elimination and substitution methods.

31.
$$\begin{cases} 4+3y=2x \\ 3x+5y=25 \end{cases}$$

32.
$$\begin{cases} 3x - y + 2z = 0 \\ 2x + 3y + 8z = 8 \\ x + y + 6z = 0 \end{cases}$$

Simplify. Write your answer using only positive exponents.

33. -4^{-2}

34. $(-4)^{-2}$

35. $\frac{y^{6p-3}}{y^{6p+2}}$

36. $\left(\frac{x^2 y^{-3} z^{-2}}{xy} \right)^{-3}$

37. $(3x^{-2}y)^{-1}(2xy^{-3})^2$

38. $\frac{3^{-2}x^{-2}}{(x^{-3})^{-2}}$

39. $(5x)^0 + 5x^0$

40. Write 0.00380 in scientific notation.

41. Write without exponents 5.2×10^{-6}

Perform the indicated operations.

42. $(3x^3 + 6x^2 - 5) - (8x^3 + 4x + 6)$

43. $(2x - y)^2$

44. $(9x^2 + 4x + 1)(4x - 3)$

45. $4a^b(3a^{b+2} - 7)$

Factor each polynomial completely.

46. $2x^3 + 8x^2 - 24x$

47. $25m^4 - 64n^6$

48. $2x^3 + 3x^2 - 8x - 12$

49. $2x^5 + 16x^2y^3$

Solve the following equations. Give exact answers only. Students should be aware of extraneous roots and remember to delete them from the solution set.

50. $x(x + 7) = 2(x - 2)$

51. $2x^2 = \frac{17}{3}x + 1$

52. $\frac{2x + 8}{x + 3} = \frac{7}{3}$

53. $\frac{2}{x} - 3x = 1$

54. $y^2(y - 4) - 9(y - 4) = 0$

55. $\frac{6}{x + 2} + \frac{2x}{2 - x} = \frac{-24}{x^2 - 4}$

Simplify. Assume all expressions represent real numbers only. Give exact answers only.

56. $-\sqrt[6]{a^{12}b^{36}}$

57. $\left(\frac{27x^6}{y^9}\right)^{\frac{4}{3}}$

58. $512^{-\frac{2}{3}}$

59. $x^{-\frac{3}{5}}\left(x^{\frac{2}{3}} - x^{\frac{13}{5}}\right)$

60. Rationalize the denominator. $\frac{3 + \sqrt{3}}{1 - \sqrt{3}}$

61. Solve. $\sqrt{x - 1} = 3 - x$

Perform the indicated operations. Assume that all expressions represent real numbers only. Give exact answers only.

62. $\sqrt{2}(\sqrt{30} + \sqrt{18})$

63. $(\sqrt{x} - 4)^2$

64. $\frac{\sqrt{45}}{4} - \frac{\sqrt{5}}{3}$

Perform the indicated operations. Write your answer in lowest terms.

65. $\frac{2x^3 + 54}{5x^2 + 5x - 30} \cdot \frac{6x + 12}{3x^2 - 9x + 27}$

66. $\frac{5a^2 - 20}{a^3 + 2a^2 + a + 2} \div \frac{7a}{a^3 + a}$

67. $\frac{x+3}{x-4} + \frac{2x-3}{4-x}$

68. $\frac{2}{x^2-3x-4} - \frac{6}{x^2-2x-3}$

69. $\frac{2 + \frac{1}{x+3}}{1 - \frac{2}{x-3}}$

70. $\frac{4xy + 2x^2 - 9}{4xy}$

71. $\frac{2x^3 - 4x^2 + 7}{x-1}$

72. $\frac{x^{-1} + 2y^{-2}}{2y^{-1} + (2x)^{-1}}$

Perform the indicated operation and simplify. Write the result in $a + bi$ form.

73. $(3 + 7i) - (4 + 2i)$

74. $(4 + 3i)^2$

75. $\frac{5+i}{2-i}$

76. Students should know the quadratic formula. 77. Students should know how to complete the square. Test questions from 76, 77 will be quadratic equations and will say solve by either of these paper/pencil methods.

Solve each equation by any method. Give exact answers only.

78. $6x^2 + 17x = 28$

79. $x^2 + 5 = 8x$

80. $m^2 - 2m + 12 = 0$

81. $a^6 - a^2 = a^4 - 1$

82. $x^{2/3} - 6x^{1/3} = -8$

Graph. Label the center or vertex and at least 2 other points.

83. $f(x) = -2(x+1)^2 - 2$

84. $x^2 - y^2 = 16$

85. $\frac{y^2}{4} + \frac{x^2}{16} = 1$

86. $x - 4y = y^2$

87. $x^2 + y^2 + 2x - y = 1$

88. $x - y = 4$

89. $y = x^2 + 4x + 6$

90.
$$\begin{cases} 3x+4y \leq 12 \\ x-2y > 6 \end{cases}$$

91.
$$\begin{cases} x^2 + y^2 \leq 4 \\ y \geq x^2 - 1 \\ x \geq 0 \\ y \geq 0 \end{cases}$$

Identify whether each equation, when graphed, will be a parabola, circle, ellipse, or hyperbola.

92. $3y^2 = 4x - y + 1$

93. $2x^2 + y^2 + 4x + y = 2$

94. Find the vertex of the graph of $f(x) = -3x^2 - 7x + 6$

95. Find the distance between $(2, 7)$ and $(4, 4)$

96. Find the midpoint of the line segment between $(3, 8)$ and $(-7, 12)$

97. Give the equation of the circle with center $(4, -5)$ and radius 4

98. Solve the system of equations $\begin{cases} x^2 + y^2 = 10 \\ 3x + y = 0 \end{cases}$

99. If $f(x) = 2x$ and $g(x) = x + 3$, find $(f \circ g)(x)$ and $(g \circ f)(x)$.

100. Find the inverse of $f(x) = -\frac{x}{2} + 3$.

101. Write as a single logarithm $2\log_3 x - \log_3(x - 4)$

102. Use properties of logarithms to write as a sum or difference of logarithms $\log_7 \frac{yz^3}{\sqrt{x}}$

Solve for x using logarithms. If the answer is not exact, write the answer accurate to 4 decimal places.

103. $8^{3x-2} = 4$

104. $3^{3x-1} = 5$

105. $\log_4(7x - 3) = 2$

106. $\log_6 x + \log_6 2 = 2$

107. $\ln(2x + 5) = 2.37$

108. $\log(2 - 3x) - \log x = \log 2x$

109. $e^x = 2$

Graph the following equations. Label any intercepts.

110. $y = e^x - 2$

111. $y = \ln(x - 1) + 2$

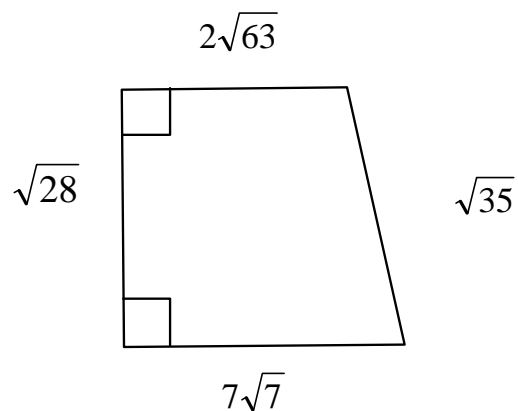
112. The length of a rectangular playing field is 5 meters less than twice its width. If 230 meters of fencing goes around the field, find the dimensions of the field.

113. James has available a 10% alcohol solution and a 60% alcohol solution. Find how many liters of each solution he should mix to make 50 liters of a 40% alcohol solution.

114. If \$10,000 and \$4000 are invested such that \$1250 is earned in one year, and if the rate of interest on the larger investment is 2% more than that of the smaller investment, find the rates of interest.

115. Two cars leave Chicago, one traveling east and the other west. After 4 hours they are 492 miles apart. If one car is traveling 7 mph faster than the others, find the speed of each.

116. If Sue can type a certain number of mailing labels in 6 hours and Tom and Sue working together can type the same number of mailing labels in 4 hours, find how long it takes Tom alone to type the mailing labels.
117. The speed of a Ranger boat in still water is 32 mph. If the boat travel 72 miles upstream in the same time that it takes to travel 120 miles downstream, find the current of the stream.
118. According to Boyle's law, the pressure exerted by a gas is inversely proportional to the volume, as long as the temperature stays the same. If a gas exerts a pressure of 1250 pounds per square inch when the volume is 2 cubic feet, find the volume when the pressure is 800 pounds per square inch.
119. A 10-foot ladder is leaning against the top of a house. The distance from the bottom of the ladder to the bottom of the house is 4 feet less than the distance from the top of the ladder to the ground. Find how far the top of the ladder is from the ground. Give an exact answer and a one-decimal-place approximation.
120. Use the compound interest equation $A = P\left(1 + \frac{r}{n}\right)^{nt}$ to find how long, to the nearest tenth of a year, it will take a \$5000 investment to double if it is invested at 7% interest compounded quarterly.
121. Memphis, Tennessee, is growing at a rate of 0.36% per year. Find how long, to the nearest tenth of a year, it will take an initial population of 650,000 to increase to 700,000. Use the population growth formula $y = y_0e^{kt}$.
122. Two angles are complementary. If the measure of one angle is x degrees, represent the measure of the other angle as an expression in x .
123. If the area of a rectangle is $x^4 - x^3 - 6x^2 - 6x + 18$ square miles and its width is $x - 3$ miles, find the length.
124. The base of a triangle is twice its height. If the area of the triangle is 42 square centimeters, find its base and height. Give the exact answer and an approximation to the nearest hundredth.
125. Find the area of the following trapezoidal room.



126. If $f(x) = 5x - x^2$, find the value of $f(3) - f(-2)$.
127. Solve $x^2 - 5x \geq 6$ and write the solution set in interval notation.