

MATH 101 – Sample Final Exam Review Fall 2006

This review is a collection of sample questions used by instructors of this course at Missouri State University. It contains a sampling of problems representing the material covered throughout the semester and may not contain every type of question on the final exam. Any material listed on the lecture schedule and/or the assignment sheet may be on the final exam. Please also be aware that a few questions on the final exam, while requiring knowledge and understanding of the content covered in the course, may be presented in a form different than the problems in the text.

Problems 1-2. Evaluate.

1. $6 - 6 \left[(3 - 5^2) \div 11 \right]$

2. $-6 - 8 \cdot 2 \div 4 \div 2 + 5$

Problems 3 - 37. Solve.

3. $x - 2 = -7$

4. $2y = -24$

5. $x + 6 = 2$

6. $-4x = -12$

7. $3x - 2 = 13$

8. $5x + 9 = -1$

9. $3x + 6 = 2x - 4$

10. $6x - 5 = 4x + 11$

11. $2(x - 1) = 3(x + 4)$

12. $5(2x + 6) = 4(3x + 7)$

13. $3(2 - x) = 4(x - 3)$

14. $7(a + 3) + 2(a - 4) = -14$

15. $7(a - 2) - 6(a + 3) = -25$

16. $9 - \frac{4}{5}x = -11$

17. $|y + 7| = 5$

18. $|2x + 7| - 3 = 2$

19. $|3x - 1| + 6 = 4$

20. $x^2 - 7x - 8 = 0$

21. $4(b + 1) + 7b = 25 - 8(1 - 3b)$

22. $-3x^2 + 12 = 0$

23. $24y^2 - 18y = 0$

24. $(x - 3)(x - 8) = -6$

25. $\frac{3}{x} + \frac{1}{2x} = \frac{7}{6}$

26. $x(x - 6) = 16$

27. $\frac{p}{p-5} - 7 = \frac{5}{p-5}$

28. $\frac{4x+5}{3x+1} = \frac{3}{5}$

29. $\frac{x-2}{4} + \frac{x+1}{8} = \frac{x}{4}$

30. $-2(x - 4) - (3x - 1) = 5x - 21$

31.

$$\frac{2q+3}{5} - \frac{3q+2}{4} = -2$$

32. $\frac{3}{z+4} - \frac{1}{2z+8} = \frac{5}{18}$

33. $-5|1-4x|+12 = -3$

34. $2x^2 = 4 - 7x$

35. $\frac{7y}{3y+12} - \frac{y+3}{y+4} = \frac{2y-1}{3y+12}$

36. $\frac{1}{x+2} - \frac{1}{x-5} = \frac{x-4}{x^2-3x-10}$

37. $\frac{2x-1}{3} - \frac{x+1}{2} = \frac{2x-9}{6}$

Problems 38 – 51 . Factor completely. If the expression cannot be factored, write “prime”.

38. $x^2 - 11x + 24$

39. $15x^2 - 2x - 8$

40. $12y^2 + 29y + 15$

41. $81p^2 - 49$

42. $27x^3 - 125$

43. $p^2 + 12p + 36$

44. $2m^2 + 4m - 70$

45. $x^2 + 25$

46. $24ab^2 - 42a^2b$

47. $y^4 - 6y^2 - 7$

48. $a^3 + 64b^3$

49. $12x^3 + 6x^2 + 6x$

50. $12ax + 18ay - 10x - 15y$

51. $x^3 - 3x^2 + 2x - 6$

Problems 52 – 77. Perform the indicated operations and simplify. Write your answer in reduced form.

52. $(3x^2 - 5x + 2) - (5x^2 + 6x - 11) + (4x^2 + 10x + 15)$

53. $(9y - 4)(3y + 2)$

54. $(5t + 2)(5t - 2)$

55. $4x(x - 2)(3x + 4)$

56. $\frac{6a^2b^2}{a^2 - 4} \cdot \frac{a - 2}{3ab^2}$

57. $\frac{(2x - 3)^2}{5x^3} \cdot \frac{20x}{4x^2 - 9}$

58. $\frac{2}{a - 2} - \frac{a + 2}{a^2 - a - 2}$

59. $\frac{x^2 + x - 12}{x^2 + 6x + 8} \div \frac{x^2 + 4x + 3}{x^2 + 3x + 2}$

60. $\frac{5x - 20}{12} \cdot \frac{8}{4 - x}$

61. $\frac{5}{x} - \frac{3}{2x}$

62. $\frac{5}{x - 4} + \frac{x}{x + 4}$

63. $\frac{3}{x^2 - 9} - \frac{2x}{x - 3}$

64. $(-19y^2 + 7yx + 7) - (y^2 + 4yx + 7)$

65. $\frac{5}{x + 6} + \frac{3}{x - 2}$

66. $(3x - 5)^2$

67. $-2x^2y^3(4xy^3 - 3xy)$

68. $\frac{5x - 3y}{x^2y^3} \div \frac{9y - 15x}{2xy^2}$

69. $\frac{y^2 - 25}{y + 3} \cdot \frac{y}{5 - y}$

70. $\frac{a^2 + a - 12}{a - 2} \div \frac{a^2 + 2a - 15}{2a - a^2}$

71. $\frac{5}{3a + 6} + \frac{8}{5a + 10}$

72. $-\frac{x + 5}{2x} + \frac{x - 5}{2x}$

73. $\frac{x^2 - 8x + 12}{x^2 + 4x - 12} \cdot \frac{x + 6}{x - 2}$

74. $\frac{5x + 2}{x^2 + 2x - 8} - \frac{4x - 2}{x^2 + 2x - 8}$

75. $(4x - 5)(2x^2 + 4x - 3)$

76. $\frac{x}{x^2 + 4x + 3} - \frac{3}{x^2 - 4x - 5}$

77. $\frac{3}{4} - \frac{5}{6} + \frac{8}{9}$

Problems 78 - 79. Reduce each rational expression to lowest terms.

$$78. \frac{3p^2 - 5p - 2}{6p^2 + 17p + 5}$$

$$79. \frac{-15a^2}{3a^2 + 9a}$$

Problems 80 – 83. Find the numbers that make the rational expressions undefined.

$$80. \frac{x+4}{x-3}$$

$$81. \frac{-9x}{x^2 - 2x - 8}$$

$$82. \frac{3}{x^2 + 5x}$$

$$83. \frac{x+2}{5}$$

Problems 84 – 92. Simplify and evaluate. Write answers with only positive exponents. Assume all variables represent positive real numbers.

$$84a. \left(\frac{2}{3}\right)^{-4}$$

$$84b. x^2 \cdot x^3 \cdot x^{-4} \cdot x^9$$

$$85a. -7^0 + 4^2 m^3 - (2m)^3$$

$$85b. \frac{x^2}{x^{-3}}$$

$$86a. -(-3)^{-4}$$

$$86b. \frac{x^{-4}}{x}$$

$$87a. 4(p^3 y)^0 (3p^{-2} y)^3$$

$$87b. (x^{-1} y^2)^3$$

$$88a. 5x^{-3}$$

$$88b. \frac{-5}{x^{-2}}$$

$$89. (5x)^{-3}$$

$$90. \left(\frac{3}{x}\right)^{-3}$$

$$91. \frac{-4a^5(a^{-1})^2}{(a^{-2})^{-3}}$$

$$92. (2m^{-2})^{-4}(m^3)^{-2}$$

Problems 93 – 104. Solve and graph on the number line. Write your answers in interval notation.

$$93. 5 - 11x \geq -2x + 32$$

$$94. -16 < 3x - 4 < 8$$

$$95. \left| \frac{7+x}{2} \right| \geq 4$$

$$96. \frac{2x-5}{-3} < 7$$

$$97. -3x - 4 > 11$$

$$98. -2 \leq \frac{1}{2}x - 5 < 1$$

$$99. -7|3n-2| \geq -35$$

$$100. -4 - (2+3m) \leq 5m+3$$

$$101. \frac{-2}{3}x + 5 \geq 29$$

$$102. |x+2| + 1 > 6$$

$$103. |x+3| - 4 < 6$$

$$104. |2x-1| + 6 < 4$$

Problems 105 – 111. Solve for the indicated variable.

$$105. 8x = 2y + bx + 5 \text{ for } x$$

$$106. a = \frac{2}{5}(b-4) \text{ for } b$$

$$107. \frac{3}{4}x + \frac{1}{2}y = -9; \text{ for } x$$

$$108. 4p - 3(y+p) = 2y \text{ for } y$$

$$109. x = ax + b \text{ for } x$$

$$110. 5x - 4y = -12 \text{ for } x$$

$$111. \frac{x-a}{b} = c, \text{ for } x$$

Problems 112 – 117. Word problems. Define the variable, set up an appropriate equation, and solve.

112. A bookstore sells a calculus book for \$78. If the bookstore makes a profit of 30% on each sale what does the bookstore pay the publisher for each book?
113. Suppose that Boyd's Hardware just announced a 20% decrease in the price of their snowblower. If one particular snowblower model sells for \$359.99 after the decrease, find the original price of the snowblower. (Round to the nearest hundredth).
114. A wire, 224 cm long, is cut into three pieces. The first is twice as long as the second. The third is one-half as long as the second. Find the length of all three pieces.
115. In January 2005, 5198 people visited the library in a small midwestern town. If this represented a 15% increase over January 2004, how many people visited the library in January 2004?
116. Jay is enrolled in three more hours this semester than Bob. Tom is enrolled in 6 fewer hours than Bob. If they are enrolled in a total of 45 hours, how many hours is each person taking? .
117. If $P(x) = 3x^3 - 4x^2 + 2$, find a. $P(2)$ b. $P(-3)$

SOLUTIONS

- | | | | | |
|--------------------|---------------------------|---------------------------|-----------------------------|--------------------|
| 1. 18 | 2. -3 | 3. $x = -5$ | 4. $y = -12$ | 5. $x = -4$ |
| 6. $x = 3$ | 7. $x = 5$ | 8. $x = -2$ | 9. $x = -10$ | 10. $x = 8$ |
| 11. $x = -14$ | 12. $x = 1$ | 13. $x = \frac{18}{7}$ | 14. $a = -3$ | 15. $a = 7$ |
| 16. $x = 25$ | 17. $y = -12, -2$ | 18. $x = -6, -1$ | 19. \emptyset | 20. $x = 8, -1$ |
| 21. $b = -1$ | 22. $x = \pm 2$ | 23. $y = 0, \frac{3}{4}$ | 24. $x = 5, 6$ | 25. $x = 3$ |
| 26. $x = 8, -2$ | 27. \emptyset | 28. $x = -2$ | 29. $x = 3$ | 30. $x = 3$ |
| 31. $q = 6$ | 32. $z = 5$ | 33. $x = \frac{-1}{2}, 1$ | 34. $x = \frac{1}{2}, -4$ | 35. $y = 4$ |
| 36. $x = -3$ | 37. $x = 4$ | 38. $(x-3)(x-8)$ | 39. $(5x-4)(3x+2)$ | 40. $(3y+5)(4y+3)$ |
| 41. $(9p-7)(9p+7)$ | 42. $(3x-5)(9x^2+15x+25)$ | 43. $(p+6)^2$ | 44. $2(m+7)(m-5)$ | |
| 45. prime | 46. $6ab(4b-7a)$ | 47. $(y^2-7)(y^2+1)$ | 48. $(a+4b)(a^2-4ab+16b^2)$ | |

49. $6x(2x^2 + x + 1)$ 50. $(6a - 5)(2x + 3y)$ 51. $(x^2 + 2)(x - 3)$ 52. $2x^2 - x + 28$
53. $27y^2 + 6y - 8$ 54. $25t^2 - 4$ 55. $12x^3 - 8x^2 - 32x$ 56. $\frac{2a}{a+2}$
57. $\frac{4(2x-3)}{x^2(2x+3)}$ 58. $\frac{a}{(a-2)(a+1)}$ 59. $\frac{x-3}{x+3}$ 60. $-\frac{10}{3}$ 61. $\frac{7}{2x}$
62. $\frac{x^2 + x + 20}{x^2 - 16}$ 63. $\frac{-2x^2 - 6x + 3}{(x-3)(x+3)}$ 64. $-20y^2 + 3yx$ 65. $\frac{8x+8}{(x+6)(x-2)}$
66. $9x^2 - 30x + 25$ 67. $-8x^3y^6 + 6x^3y^4$ 68. $\frac{-2}{3xy}$ 69. $\frac{-y(y+5)}{y+3}$
70. $\frac{-a(a+4)}{a+5}$ 71. $\frac{49}{15(a+2)}$ 72. $\frac{-5}{x}$ 73. $\frac{x-6}{x-2}$ 74. $\frac{1}{x-2}$
75. $8x^3 + 6x^2 - 32x + 15$ 76. $\frac{x-9}{(x+3)(x-5)}$ 77. $\frac{29}{36}$ 78. $\frac{p-2}{2p+5}$ 79. $\frac{-5a}{a+3}$
80. $x = 3$ 81. $x = -2, 4$ 82. $x = 0, -5$ 83. None 84a. $\frac{81}{16}$
- 84b. x^{10} 85a. $-1 + 8m^3$ 85b. x^5 86a. $-\frac{1}{81}$ 86b. $\frac{1}{x^5}$
- 87a. $\frac{108y^3}{p^6}$ 87b. $\frac{y^6}{x^3}$ 88a. $\frac{5}{x^3}$ 88b. $-5x^2$ 89. $\frac{1}{125x^3}$
90. $\frac{x^3}{27}$ 91. $\frac{-4}{a^3}$ 92. $\frac{m^2}{16}$ 93. $(-\infty, -3]$ 94. $(-4, 4)$
95. $(-\infty, -15] \cup [1, \infty)$ 96. $(-8, \infty)$ 97. $(-\infty, -5)$ 98. $[6, 12)$
99. $[-1, 7/3]$ 100. $[-9/8, \infty)$ 101. $(\infty, -36]$ 102. $(-\infty, -7) \cup (3, \infty)$
103. $(-13, 7)$ 104. \emptyset 105. $x = \frac{2y+5}{8-b}$
106. $b = \frac{5a+8}{2}$ or $b = \frac{5}{2}a + 4$ 107. $x = \frac{-2y-36}{3}$ or $x = \frac{-2}{3}y - 12$ 108. $y = \frac{p}{5}$
109. $x = \frac{b}{1-a}$ 110. $x = \frac{4y-12}{5}$ 111. $x = bc + a$ 112. \$60.00

113. \$449.99

114.. First piece 128 - cm., Second piece 64 - cm., Third piece - 32 cm.

115. 4520 people

116. Jay 19 hours, Bob 16 hours. Tom 10 hours

117. a. 10 b. -115