

### Sample problems for common Final Exam Math 115 LASC

Directions: To receive credit show enough work so that your method of solution is clear. Box answers. Show all work on this test form. No Work=No Credit.

1. Write in symbols: (a) The quotient of -6 and the sum of 2 and -8. (b) Now Simplify the expression in part a.
2. Simplify  $(-5)(-12) + 4(-4) + (-8)^2$
3. Simplify  $\frac{30(-1-2)}{-9[3-(-2)]-12(-2)}$
4. Evaluate  $3x - 4y^2$ , given  $x=-2$  and  $y=4$
5. Solve  $-\frac{4}{7}x = -12$
6. Solve for t in  $r \cdot t = d$
7. Solve  $7 - (x - 4) = -3x + 2(x + 1)$
8. Solve  $0.6(x + 20) + 0.8(x - 10) = 46$
9. In the 2005 baseball season, the St. Louis Cardinals won the most games of any major league team. The Cardinals won 24 less than twice as many games as they lost. They played 162 regular-season games. How many wins and losses did the Cardinals have? (a) Declare variables. (b) Box the equation (c) Solve. Write a sentence, include units.
10. Find the measure of an angle if its supplement measures  $10^\circ$  more than three times its complement (a) Declare variables. (b) Box the equation (c) Solve. Write a sentence, include units.
11. Given  $X - Y = 4$  (a) Find the x and y intercepts (b) Graph linear equation.
12. **Graph**  $y = \frac{2}{3}x - 4$  by using the slope and y-intercept. Attention! Following directions for credit!
13. Find the slope of  $2x + y = 10$  and the y-intercept.

For problems 14 & 15, write the equation of the line with the given information. Leave answer in the slope-inter form.

14. Through (0,3) and  $M=-2$

15. Through (2, -6) and (1,3)

For problems 16 & 17 solve each inequality and graph the solution set on the number line.

16.  $-4x+2(x-3)\geq 4x-(3+5x)-7$

17.  $-10<3x-4\leq 14$

18. Graph the following linear inequality on the plane,  $x + y \leq 3$  Do not forget to show your test point.

19. Two cars leave from the same point, traveling in opposite directions. One travels at a constant rate of 50 mph, while the other travels at a constant rate of 65 mph. How long will it take for them to be 460 miles apart? (a) Set up the table and fill in the 6 boxes. (b) Write an equation using the table. (c) Solve the equation.

20. Solve the system by graphing

$$\begin{aligned}x - 2y &= 6 \\x + 2y &= 2\end{aligned}$$

21. Solve the system by the substitution method

$$\begin{aligned}2x + y &= -4 \\x &= y + 7\end{aligned}$$
 check your answer!

22. Solve the system by the Elimination method

$$\begin{aligned}4x + 5y &= 2 \\-8x - 10y &= 6\end{aligned}$$
 check your answer!

23. Solve the system by the Elimination method

$$\begin{aligned}4x + 2y &= 2 \\5x + 4y &= 7\end{aligned}$$
 check your answer!

24. Jovan has a 25% solution of alcohol to mix with a 40% solution to get 50 liters of a final mixture that is 30% alcohol. How much of each of the original solutions should he use?

25. Graph the solution set of each system of linear inequalities:

$$\begin{aligned}2x + 7y &\leq 14 \\x - y &\geq 1\end{aligned}$$
 Show your test points! **Only shade the final answer!**

For problems 26-29 **Simplify** each the following expression:

26.  $(-3)^0 + 4^0 - 5$

27.  $4^{-2} + 4^{-1}$

28.  $\frac{8^{-2} \cdot 8^6}{8^{-8}}$

29.  $\frac{(x^{-3})^{-2}(x^{-1}y)^2}{(xy^{-2})^2}$

30. Write 12,000,000,000,000 in scientific notation

31. Write  $3.6 \times 10^{-4}$  in standard notation (without exponents)

32. Subtract  $(-9a^3b^2 + 13ab^5 + 5a^2b^2) - (6ab^5 + 12a^3b^2 + 10a^2b^2)$

For problem 33-35, **multiply** each of the following:

33.  $(2x - y)(4x + 3y)$

34.  $(2x - y)(2x + y)$

35.  $(5x - 2y)^2$

36. Divide  $\frac{8y^3 - 6y^2 + 4y}{2y}$

37. Divide by using polynomial long division  $\frac{8x^3 - 10x^2 - x + 3}{2x + 1}$

For problems #38-43 **Factor completely**, if possible.

38.  $12x^2 - 30x$

39.  $2x^3y^2 + 3x^3y - 5x^2y^2$

40.  $2ax - 2bx + ay - by$

41.  $4x^2 - 28xy + 49y^2$

42.  $81x^4 - 16y^4$

43.  $36x^2 + 81x + 45$

44. Solve by factoring  $x^2 - 11x + 24 = 0$

45. Solve by factoring  $2y^2 - 13y + 6 = 0$

For problems 46 & 47 **find the values** for each of the following rational expressions which make it **undefined**. (Find the domain)

46.  $\frac{3x-1}{x^2-2x-8}$

47.  $\frac{x^2-7}{3x+21}$

For problems 48 & 49 write each of the following in **lowest terms**. (Simplify or reduce)

48.  $\frac{6x^2+x-2}{2x^2-3x+1}$

49.  $\frac{y^3-y}{y+1}$

50. **Divide.** (Write in lowest terms)  $\frac{x^2-4x-5}{x^2-49} \div \frac{x^2-2x-3}{x+7}$

51. A right triangle is such that one leg is 3 meters shorter than the other leg. The triangle has area of  $54m^2$ . Find the lengths of the legs. (a) Declare variables. (b) Box the equation (c) Solve. Write a sentence, include units.

52. Multiply and simplify  $\sqrt{5}\sqrt{10}$

53. Multiply and simplify  $\sqrt{3ab}\sqrt{6ab^3}$

54. Rationalize the denominator  $\sqrt{\frac{2}{5}}$

55. Simplify  $\sqrt{\frac{144}{a^2}}$

56. Divide and simplify  $\frac{\sqrt{35x}}{\sqrt{80xy^2}}$

57. Subtract and simplify  $3\sqrt{18} - 5\sqrt{18}$

58. Solve  $\sqrt{3x+2} = 14$

59. Find the **LCM** of  $y^2-9, y^2+10y+21, y^2+4y-21$

60. Subtract and **simplify** if possible.  $\frac{1}{x^2-16} - \frac{x+4}{x^2-3x-4}$

61. Simplify:

$$\frac{9 - \frac{1}{y^2}}{3 - \frac{1}{y}}$$

62. Divide  $\frac{25x^2 - 1}{9x^2 - 6x} \div \frac{5x^2 + 9x - 2}{3x^2 + x - 2}$

For problems 62 & 63 **SOLVE**

62.  $\frac{7}{y} - \frac{1}{3} = \frac{1}{4}$

63.  $\frac{15}{x} - \frac{15}{x-2} = -2$

64. The numbers on three raffle tickets are consecutive integers whose sum is 7530. Find the integers. **(a) Declare variable(s).** **(b) Write an equation which models problem.** (c) Solve

For problems 65 & 66 solve the quadratic equation by the quadratic formula.

65.  $x^2 - 3x - 10 = 0$

66.  $3x^2 - 5x + 1 = 0$

**ANSWER KEY:**

1. (a)  $\frac{-6}{2 + (-8)}$  (b) 1

2. 108

3.  $\frac{30}{7}$

4. -70

5.  $x = 21$  or  $\{21\}$     6.  $t = \frac{d}{r}$     7. No solution or  $\{ \}$     8.  $x = 30$  or  $\{30\}$

9. 100 games won and 62 games lost.

10. (b)  $180 - x = 3(90 - x) + 10$  (c)  $x = 50$  degrees.

11. x-intercept=(4,0), y-intercept=(0,-4)

12. slope=2/3 and y-intercept=(0,-4) Graph: TBA

13. slope=-2 and y-intercept=(0,10)

14.  $y=-2x + 3$

15.  $y=-9x + 12$

16.  $x \leq 4$  Graph TBA

17.  $-2 < x \leq 6$  Graph TBA

18. TBA 19. In 4 hours the cars will meet.

20. (4,-1) 21. (1,-6) 22. **No solution.** Or  $\emptyset$  or empty set. 23. (-1,3)

24.  $33\frac{1}{3}$  liters of the 25% solution must be mixed with  $16\frac{2}{3}$  liters of the 40% solution.

25. Graph TBA 26. -3 27.  $\frac{5}{16}$  28.  $8^{12}$  29.  $x^2y^6$  30.  $1.2 \times 10^{16}$

31. 0.00036

32.  $-21a^3b^2 + 7ab^5 - 5a^2b^2$

33.  $8x^2 + 2xy - 3y^2$

34.  $4x^2 - y^2$

35.  $25x^2 - 20xy + 4y^2$

36.  $4y^2 - 3y + 2$

37.  $4x^2 - 7x + 3$

38.  $6x(2x - 5)$

39.  $x^2y(2xy + 3x - 5y)$

40.  $(a - b)(2x + y)$

41.  $(2x - 7y)^2$

42.  $(3x + 2y)(3x - 2y)(9x^2 + 4y^2)$

43.  $9(4x+5)(x+1)$

44.  $\{3,8\}$

45.  $\left\{\frac{1}{2},6\right\}$

46. 4 and -2 or Domain is all real numbers except 4 and -2. Or  $x \neq 4, x \neq -2$

47.  $x \neq -7$

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

49.  $y(y-1)$  or  $y^2 - y$

50.  $\frac{x-5}{x-7}$

51. The measure of the short leg is 9 meters and the long leg is 12 meters.

52.  $5\sqrt{2}$

53.  $3ab^2\sqrt{2}$

54.  $\frac{\sqrt{10}}{5}$

55.  $\frac{12}{a}$

56. We assume that all variables are non-negative.  $\frac{\sqrt{7}}{4y}$

57.  $-6\sqrt{2}$

58. Possible solution  $x=48$ , but it checks; therefore  $\{48\}$

59.  $(y-3)(y+3)(y+7)$

60.  $\frac{-x^2-7x-15}{(x+4)(x-4)(x+1)}$

61.  $\frac{3y+1}{y}$

62.  $y=12$  or  $\{12\}$  Possible solution checks.

63.  $\{-3,5\}$  Both possible solutions check.

64. 2509, 2510, 2511 are the three consecutive raffle tickets.

65.  $\{-2,5\}$

66.  $\left\{\frac{5 \pm \sqrt{13}}{6}\right\}$