

Meramec College Algebra TEST 4 Spring 2008

NAME: \_\_\_\_\_ Score \_\_\_\_\_/100  
Please print

**SHOW ALL YOUR WORK IN A NEAT AND ORGANIZED FASHION**  
**Questions 1-20 are 2 pts each, 21 – 32 are 5 pts each.** Course Average \_\_\_\_\_

- 1. T F The ln function has an inverse
- 2. T F The  $\log_7$  and ln functions have the same x-intercepts.
- 3. T F If kt and ph are functions then  $(kt + ph)(x) = kt(x) + ph(x)$ .
- 4. T F The base for the exp function is 10
- 5. T F  $\ln \circ \exp(3x + 7) = 3x + 7$
- 6. T F The graph of ln is entirely above the x-axis.
- 7. T F The graph of exp is entirely above the x-axis.
- 8. T F If the graph of a function fails the horizontal line test, the function has no inverse.
- 9. T F If the graph of a function is a non-horizontal line, the function has an inverse.
- 10. T F  $\ln(x+y) = \ln(x) + \ln(y)$
- 11. T F If t is a real number, then  $\ln(t)$  is a positive real number.

**Fill in the blanks**

- 12. The zero of the ln function is \_\_\_\_\_
- 13. The y-intercept of log is \_\_\_\_\_
- 14. The domain of exp is \_\_\_\_\_
- 15. The domain of ln is \_\_\_\_\_
- 16. If f and g are functions such that  $f \circ g(x) = x$  and  $g \circ f(x) = x$ , then f and g are \_\_\_\_\_
- 17. If the rule for a function f is  $f(x) = 3^{x-5}$ , then  $f(8) =$  \_\_\_\_\_
- 18. What is the rule for the  $\exp_2$  function? \_\_\_\_\_
- 19. The inverse  $f^{-1}$  of a function f is the inverse with respect to \_\_\_\_\_
- 20. If q and p are functions, the rule for the composition  $p \circ q$  is \_\_\_\_\_

**For the remaining problems you must show your work to receive credit.**

- 21. Solve the equation  $3e^x = 10$

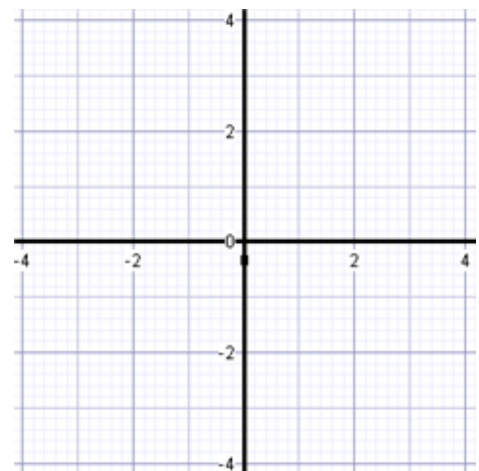
22. The rule for the function  $f$  is  $f(x) = 7x + 9$ . Find the rule for its inverse  $f^{-1}$ . Show the steps.

23. Solve the equation  $\ln(3x - 2) = 1$

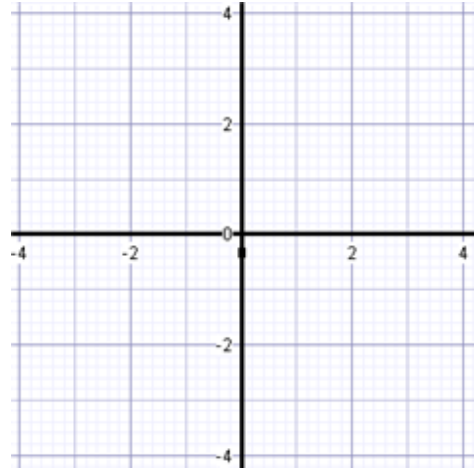
24. Suppose the process of solving the equation  $\ln(2x - 3) + \ln(x + 4)^3 = 5\ln(x) + \ln(2x + 7)$  produces the real number 1 as a possible solution. **Explain why 1 is not a solution of the equation.**

**NOTE:** Do not substitute 1 into the equation and determine that a false statement results—that procedure will fail and is a waste of your time.

25. Sketch the graph of  $\exp$ .



26. Sketch the graph of  $\ln$



27. Write  $e^3 = y$  in logarithmic form

28. If  $f$  and  $g$  are functions such that  $f(2) = 7$ ,  $f(4) = 3$ ,  $g(2) = 4$ , and  $g(7) = 4$ , then  $f \circ g(2) = \underline{\hspace{2cm}}$ .

29. Suppose  $f$  and  $g$  are functions whose rules may be written as  $f(x) = 2x^2 - 1$  and  $g(x) = 3x + 2$ . Find the rule for the composition  $g \circ f$ . Write the rule correctly as a rule.

30. The rule for a function  $f$  is  $f(x) = \sqrt{x-5}$ . Find two functions  $g$  and  $h$  (give their rules) such that  $f = g \circ h$

31. Simplify  $\ln(x) + \ln(x+1)$ .

32. The rules for two function  $f$  and  $g$  are  $f(x) = \frac{x}{x-2}$  and  $g(x) = \frac{x+2}{x}$ . Show that  $f$  and  $g$  are not inverses of each other.