Meramec College Algebra Chapter 4 TEST 4 Summer 2010

NAME: _____Score_____/100

Please print

SHOW ALL YOUR WORK IN A NEAT AND ORGANIZED FASHION Course Average_____

No Decimals No mixed numbers No complex fractions No boxed or circled answers

Each Question is worth 3 points.

1. **T** F The number e is irrational.
2. **T** F For each exponential function, the y-intercept is 1.
3. T **F** For each exponential function, there is one x-intercept.
4. **T** F For each exponential function, the x-axis is a horizontal asymptote.
5. T **F** For each logarithm function, the x-intercept is 0.
6. **T** F The exponential function base e has an inverse.
7. **T** F The graph of the ln function passes both the vertical and horizontal line test.
8. **T** F The rule for the function exp is $\exp(x) = e^x$.
9. **T** F For logarithm function ln, the y-axis is a vertical asymptote.
10. T **F** $\ln(xy)=\ln(x)\ln(y)$.

Complete each of the rules in Questions 11 – 20.

11. If $e^x = e^y$, then **x = y**.

12. If $\ln(x) = \ln(y)$, then **x = y**.

13. $e^x e^y = \mathbf{e^{x+y}}$.

14. $\ln(x) - \ln(y) = \ln\left(\frac{x}{y}\right)$.

15. $\ln(x^y) = \mathbf{y\ln(x)}$.

16. $\ln(\exp(x)) = \mathbf{x}$.

17. $\ln(e^x) = \mathbf{x}$.

18. $\exp(\ln(x)) = \mathbf{x}$.

19. $e^0 = 1$.

20. $e^1 = \mathbf{e}$.

Evaluate/simplify each of the expressions in Questions 21 – 24.

21. $\ln(e^6) = \mathbf{6}$.

21. $\exp(\ln(17)) = \mathbf{17}$.

22. $e^{\ln(4)} = \mathbf{4}$.

23. $\ln(\exp(9x - 5)) = \mathbf{9x - 5}$.

24. $\exp_2(3) = 2^3 = 8$.

25. Write $7 = \ln(5)$ in equivalent exponential form.

$\mathbf{\exp(7) = \exp(\ln(5))}$

$\mathbf{e^7 = 5}$

26. Write $e^2 = x + 5$ in equivalent logarithmic form.

$\mathbf{\ln(e^2) = \ln(x + 5)}$

$\mathbf{2 = \ln(x + 5)}$

27. Condense/simplify $\ln(x) + 2\ln(y)$.

$\mathbf{\ln(x) + 2\ln(y) = \ln(x) + \ln(y^2) = \ln(xy^2)}$

28. Condense/simplify $\log(3x + 7) - \log(x)$

$\log(3x + 7) - \log(x) = \log\left(\frac{3x + 7}{x}\right)$

29. Expand $\ln(xy^3)$

$\ln(xy^3) = \ln(x) + \ln(y^3) = \ln(x) + 3\ln(y)$

30. Solve the equation $5e^x = 23$

$$5e^x = 23$$
$$e^x = \frac{23}{5}$$
$$\ln\left(e^x\right) = \ln\left(\frac{23}{5}\right)$$
$$x = \ln\left(\frac{23}{5}\right)$$

31. Solve the equation $\ln(x) = 3$

$\ln(x) = 3$

$\exp(\ln(x)) = \exp(3)$

$x = e^3$

32. Solve the equation $\ln(3x + 5) = 3$

$\ln(3x + 5) = 3$

$\exp(\ln(3x + 5) = \exp(3)$

$3x + 5 = e^3$

$3x = e^3 - 5$

$$x = \frac{e^3 - 5}{3}$$

33. Solve the equation $\ln\left(\sqrt{x+4}\right) = 1$

$\ln\left(\sqrt{x+4}\right) = 1$ $\exp\left(\ln\left(\sqrt{x+4}\right)\right) = \exp(1)$ $\sqrt{x+4} = e$ $x + 4 = e^2$ $x = e^2 - 4$	$\ln\left(\sqrt{x+4}\right) = 1$ $\ln\left((x+4)^{\frac{1}{2}}\right) = 1$ $\frac{1}{2}\ln(x+4) = 1$ $\ln(x+4) = 2$ $\exp(\ln(x+4)) = \exp(2)$ $x + 4 = e^2$ $x = e^2 - 4$