

NAME: _____ Score _____ /100

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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. $e^x e^y = e^{x+y}$.

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

15. $\ln(x^y) = y\ln(x)$.

16. $\ln(\exp(x)) = x$.

17. $\ln(e^x) = x$.

18. $\exp(\ln(x)) = x$.

19. $e^0 = 1$.

20. $e^1 = e$.

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

21. $\ln(e^6) = 6$.

21. $\exp(\ln(17)) = 17$.

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

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

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

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

$$\exp(7) = \exp(\ln(5))$$

$$e^7 = 5$$

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

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

$$2 = \ln(x + 5)$$

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

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

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 $5e^x = 23$

$$5e^x = 23$$

$$e^x = \frac{23}{5}$$

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

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

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 $\ln(\sqrt{x+4}) = 1$

$$\ln(\sqrt{x+4}) = 1$$

$$\exp(\ln(\sqrt{x+4})) = \exp(1)$$

$$\sqrt{x+4} = e$$

$$x+4 = e^2$$

$$x = e^2 - 4$$

$$\ln(\sqrt{x+4}) = 1$$

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

$$\frac{1}{2}\ln(x+4) = 1$$

$$\ln(x+4) = 2$$

$$\exp(\ln(x+4)) = \exp(2)$$

$$x+4 = e^2$$

$$x = e^2 - 4$$

