Honors Math III

Name McG Key

F'18

Natural Logarithms

Express as a single logarithm or number.

1. $2\ln x + 3\ln y$

$\ln x^2 + \ln y^3$

$\ln(x^2 y^3)$

2. $\ln c + \frac{\ln a}{3} + \frac{\ln b}{3}$

$\ln c\sqrt[3]{ab}$

3. $\frac{1}{2}\ln 4 - \frac{1}{3}\ln 8$

$\ln \frac{4^{1/2}}{8^{1/3}} = \ln \frac{2}{2}$

$= \ln 1 = 0$

4. $\frac{\ln x}{2} + \frac{\ln y}{2} + \frac{\ln z}{2}$

$\frac{1}{2}\ln x + \frac{1}{2}\ln y + \frac{1}{2}\ln z$

$\ln \sqrt{xyz}$

5. $\ln a + \ln b + 2\ln c$

$\ln(abc^2)$

6. $3\ln 3 - 4\ln x$

$\ln \frac{3^3}{x^4} = \boxed{\ln \frac{27}{x^4}}$

Solve each equation

7. $\ln x + \ln 2x = \ln e^3$

$\ln 2x^2 = \ln e^3$

$2x^2 = e^3$

$x^2 = \frac{e^3}{2}$

$\boxed{x = \sqrt{\frac{e^3}{2}}}$

8. $\ln(4x - 1) = \ln e^{36}$

$4x - 1 = e^{36}$

$4x = e^{36} + 1$

$\boxed{x = \frac{e^{36}+1}{4}}$

9. $\ln(3x + 5) = 4$

$e^4 = 3x + 5$

$\boxed{\frac{e^4 - 5}{3} = x}$

10. $\ln(2x - 1) = 0$

$e^0 = 2x - 1$

$1 = 2x - 1$

$2 = 2x$

$\boxed{x = 1}$

11. $\ln 4 + 2\ln x = 0$

$\ln 4 \cdot x^2 = 0$

$e^0 = 4x^2$

$1 = 4x^2$

$\frac{1}{4} = x^2$

$x = \sqrt{\frac{1}{4}}$

$\boxed{x = \frac{1}{2}}$

12. $e^{2x} = 10$

$\ln_e 10 = 2x$

$\boxed{\frac{\ln 10}{2} = x}$

1.151

13. $e^{x+1} = 30$

$\ln_e 30 = x + 1$

$\boxed{(\ln 30) - 1 = x}$

2.890

14. $e^x = 18$

$\boxed{\ln_e 18 = x}$

15. $e^{\frac{x}{5}} + 4 = 7$

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

$\ln_e 3 = \frac{x}{5}$

$\boxed{5\ln 3 = x}$

$\ln 3^5 = x$