

1) Use a calculator to approximate each to the nearest thousandth

a) $\ln 6.2$

≈ 1.825

b) $\ln 2.1$

≈ 0.742

c) $\ln e$

$= 1$

d) e^5

≈ 148.413

2) Expand each logarithm

a) $\ln x^2$

$= 2 \ln x$

b) $\ln \sqrt[3]{x}$

$= \ln(x)^{1/3}$

$= \frac{1}{3} \ln x$

c) $\ln \frac{u^3}{wv^4}$

$= \ln u^3 - (\ln w + \ln v^4)$

$= 3 \ln u - \ln w - 4 \ln v$

3) Condense each expression to a single logarithm

a) $4 \ln 2$

$= \ln(2)^4$

$= \ln 16$

b) $\ln 10 - 5 \ln 7$

$= \ln 10 - \ln(7)^5$

$= \ln 10 - \ln 16807$

$= \ln\left(\frac{10}{16807}\right)$

c) $3 \ln x + 3 \ln y$

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

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

4) Solve each equation. Round your answer to 4 decimal places if necessary.

a) $e^x = 2$

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

$x \ln e = \ln 2$

$x(1) = \ln 2$

$x \approx 0.6931$

b) $e^{-3n} = 83$

$\ln(e)^{-3n} = \ln 83$

$-3n \ln e = \ln 83$

$-3n(1) = \ln 83$

$n = \frac{\ln 83}{-3}$

$n \approx -1.4729$

d) $9e^{1.4p-10} - 10 = 17$

$9e^{1.4p-10} = 27$

$e^{1.4p-10} = 3$

$\ln(e)^{1.4p-10} = \ln 3$

$(1.4p-10) \ln(e) = \ln 3$

$(1.4p-10)(1) = \ln 3$

$1.4p-10 = \ln(3)$

$p = \frac{\ln(3)+10}{1.4}$

$p \approx 7.9276$

c) $e^{k+7} = 26$

$\ln(e)^{k+7} = \ln 26$

$(k+7) \ln(e) = \ln 26$

$(k+7)(1) = \ln 26$

$k+7 = \ln 26$

$k = \ln(26) - 7$

$k \approx -3.7419$

$$e) \ln x = -5$$

$$e^{-5} = x$$

$$x \approx 0.0067$$

$$f) 7.316 = e^{\ln(2x)}$$

$$\ln(7.316) = \ln(e^{\ln(2x)})$$

$$\ln(7.316) = \ln(2x) \ln(e)$$

$$e^{\ln(7.316)} = 2x$$

$$x = \frac{e^{\ln(7.316)}}{2}$$

$$x = 3.658$$

$$g) \ln(-m) = \ln(m+10)$$

$$-m = m+10$$

$$-10 = 2m$$

$$m = -5$$

$$h) \ln(9x+1) = \ln(x^2+9)$$

$$9x+1 = x^2+9$$

$$0 = x^2 - 9x + 8$$

$$0 = (x-8)(x-1)$$

$$x_1 = 8 \quad x_2 = 1$$

$$i) \ln(1-8x) - 10 = -7$$

$$\ln(1-8x) = 3$$

$$e^3 = 1-8x$$

$$\frac{e^3-1}{-8} = x$$

$$x \approx -2.3857$$

$$j) \ln(5-2x^2) + \ln 9 = \ln 43$$

$$\ln[(5-2x^2)(9)] = \ln(43)$$

$$9(5-2x^2) = 43$$

$$45 - 18x^2 = 43$$

$$-18x^2 = -2$$

$$x^2 = \frac{1}{9}$$

$$x = \pm \frac{1}{3}$$