Li Chen @ Fall 2006

Math 131

Supplementary problems #2 --- Logarithmic Functions

1. Solve for x:

(a) $\log x = 2$ (b) $\ln x = -\frac{3}{4}$ (c) $3\log_3 x = 5$

(d) $5 \cdot 10^{5x} = 3$ (e) $3 \cdot 10^{2-5x} = 4$ (f) $e^{x^2} = 4$

(g) $2 \cdot e^{3x-1} = 1$ (h) $2 \cdot 3^{2x} = 1$ (i) $\log x^2 = 9$

2. Simply:

(a) $\log 10^4$ (b) $10^{\log 2\pi}$ (c) $\log \frac{1}{\sqrt{10}}$

(d) $e^{3\ln 2}$ (e) $e^{0.5\ln 9}$ (f) $\sqrt{3^{\log_3 2}}$

3. Write the following quantity in terms of log x, log y, log z, ln x, ln y, and ln z.

(a) $\log(x^2\sqrt{y} \cdot z)$ (b) $\log\sqrt{xyz}$ (c) $\log \frac{\sqrt{x} \cdot 10^y}{z}$

(d) $\ln \frac{e^x y^2}{\sqrt{z}}$ (e) $\ln(x^2 \cdot \sqrt[5]{y^4} \cdot z)$ (f) $\ln \frac{x^5}{\sqrt{y \cdot z^2}}$

4. Write the given quantity as one logarithm.

(a) $2\log x + \log y$ (b) $2\log x - \log y$ (c) $\frac{1}{2}\log x - \frac{1}{3}\log y$

(d) $2\log x - \frac{1}{2}\log y + \log z$ (e) $\sqrt{2}\ln x - \ln y$ (f) $3\ln x + \ln y - \frac{1}{3}\ln z$

5. An individual deposits $2,000 into account with an annual rate of 6% compounded annually and $1,000 with an annual rate 9% compounded annually. How long will it take for the amount in the second account to equal the amount in the first account?

6. A population grows according to $P(t) = P_0 e^t$, where t is measured in years. How long before the population triples?

Answers:

1.

(a) 100 (b) .4724
(c) 6.24 (d) -.0444
(e) .375 (f) ± 1.177
(g) .1023 (h) -.315
(i) ± 31622.78

2.

(a) 4 (b) 2π
(c) - .5 (d) 8
(e) 3 (f) $\sqrt{2}$

3.

(a) $2\log x + \frac{1}{2}\log y + \log z$

(b) $\frac{1}{2}(\log x + \log y + \log z)$

(c) $\frac{1}{2}\log x + y - \log z$

(d) $x + 2\ln y - \frac{1}{2}\ln z$

(e) $2\ln x + \frac{4}{5}\ln y + \ln z$

(f) $5\ln x - \frac{1}{2}\ln y - \ln z$

4.

(a) $\log(x^2 y)$ (b) $\log\frac{x^2}{y}$

(c) $\log\frac{\sqrt{x}}{\sqrt[3]{y}}$ (d) $\log\frac{x^2 z}{\sqrt{y}}$

(e) $\ln\frac{x^{\sqrt{2}}}{y}$ (f) $\ln\frac{x^3 y}{\sqrt[3]{z}}$

5. 24.8 years

6. 1.0986 years