

Homework 12

(due April 10)
Math 130 *Kovitz* 2018

1. Find

- (a) $\log_4 64$
- (b) $\log_{64} 4$
- (c) $\log_{64}(1/4)$
- (d) $\log_{\frac{1}{4}} 64$
- (e) $\log_4 \left(\frac{\sqrt{2}}{16} \right)$

2. (a) Graph

$$y = \log_4 x.$$

Plot all intercepts and the designated points on the graph where $x = \sqrt{2}$, $x = 1/2$, $x = \frac{1}{16}$, $y = 0$, $y = -1$, $y = 1/2$, and $y = 1.5$. Label each of these points with its coordinates.

Designate the asymptote and label it with its equation or description. In what quadrants does the graph of $\log_4 x$ lie? Find the domain and range. Is this a function? Is it one-to-one? Is it odd? even? Does it have any of the four usual symmetries? Is it increasing or decreasing? What is its concavity?

- (b) Does it have the same shape as the graph of $y = \log_2 x$? Or is it an expansion or contraction of $\log_2 x$?
- (c) At how many points does this graph meet the graph of $y = x$? Determine by inspecting the two graphs.
Find the exact coordinates of any points of intersection.
- (d) Would the graph of $y = 3 - \log_4(x + 1)$ have the same shape as $y = \log_4 x$?
If so, make a list of transformations (including one reflection) that would produce $y = 3 - \log_4(x + 1)$ from $y = \log_4 x$. No need to graph anything.

3. Solve for x :

$$\log_4 x - \log_4(2x - 1) = 1/2.$$

Check your solutions in the original equation.

4. Solve for x :

$$\log_4(x + 1) - \log_4(x - 1) = -1/2 + \log_4 3.$$

Check your solutions in the original equation to determine if they are valid.

Problems 5 through 11 follow on the next page.

5. Solve for x :

$$\log_2(x+2) = 4 - \log_2(x-4).$$

Check your solutions in the original equation.

6. Solve for x .

$$\log_4(3-x) - 2\log_4 x = 1.$$

Check your solutions in the original equation.

7. Approximate the logarithm, using the properties of logarithms, given $\log_b 2 \approx 0.24$.

(a) $\log_b 8$

(b) $\log_b \sqrt{2}$

(c) $\log_2 b$

8. Use the appropriate rules of logarithms to simplify to an exact real number, but do not use a calculator.

(a) i. $\log_8 16 - \log_8 2$

ii. $\log_{25} 37.5 + \log_{25} \frac{2}{3}$

iii. $\log_6 4 + 2\log_6 3$

iv. $\log_4 14 + \log_4 \frac{1}{7}$

v. $\log_2 \sqrt[3]{16\sqrt{2}}$

(b) i. $\log_5 (0.04\sqrt{5})$

ii. $\log_4 (.5\sqrt[4]{2})^2$

9. With a calculator, approximate $\log_6 120$ to 5 places after the decimal point.

10. (a) Find $\log_2 A$, given that $\log_8 A = \pi$.

- (b) Find $\log_{\frac{1}{3}} A$, given that $\log_3 A = .2$.

11. Simplify $4^{-3+2\log_2(3)}$.