

Mth 30, Homework 8 on sections 4.3, 4.4, 4.5, 4.6

Due by Wed, Apr 3.

Please use lots of space and explain your answers, showing clearly any work you had to do. Each question is worth 3 points.

(1) Find the following:

(a) $\log_2(16)$ (b) $\log_9(1)$ (c) $\log_3(243)$

(Hint: remember you are looking for a power.)

(2) Convert into exponential form: $\log_8(a) = b$

(Hint: in other words give the same information without mentioning logs.)

(3) Evaluate the following:

(a) $\log_3\left(\frac{1}{27}\right)$ (b) $\log_7(\sqrt{7})$ (c) $\log(0.01)$ (d) $\ln(e^{2000})$

(4) Answer these questions about the function $\log_3(x)$

(a) Sketch its graph. Include at least two points on the graph and draw the vertical asymptote. Remember to number and label the axes.

(b) Give its domain.

(c) Give its range.

(d) Where is it positive? Give your answer in interval notation.

(5) Sketch the graph of $\log_3(x - 2) - 1$ by transforming your graph from the last question. Make sure to show the new vertical asymptote and new x intercept.

(6) Expand as much as possible and simplify: $\log_3\left(\frac{x^2y^5}{81}\right)$

(7) If $\log_b(x) = 18$ and $\log_b(y) = 2$ then find:

(a) $\log_b(xy)$

(b) $\log_b(x/y)$

(c) $\log_b(y^5)$

(d) $\log_x(b)$

(Hint: Use the properties of logs such as the product and quotient rules. Can you see why the answer to (a) is 20?)

- (8) Combine into a single logarithm and evaluate: $\log(6) + \log(50) - \log(3)$
- (9) Use the change of base formula to express $\log_3(30)$ using the natural logarithm (with base e). Then use your calculator to evaluate it correct to 4 decimal places. Since $3^3 = 27$ your answer should be a bit bigger than 3.
- (10) Solve the exponential equation $2^x = 10$ and give the solution in terms of logs and as a decimal. (Do you see why x must be between 3 and 4?)
- (11) Solve the exponential equation: $4 \cdot 2^{3x+1} = 16^{2x+2}$
- (12) Solve the logarithmic equation: $5 + \log_2(3x - 1) = 8$
-

If you get stuck on a question or aren't sure if you understand it:

- Go over the relevant class notes and section in the textbook.
- Check if you get the right answer for a similar odd-numbered question in the textbook (answers at the back of the book).
- Ask me about it after class.
- Come to my office hours: Mon 12:00 - 1:00, Wed 12:00 - 1:00 in CP 317.
- Go to the Math Tutorial Lab in-person in CP 303 or online.