

Chapter 5 Investigation

Below are several investigation questions inspired by Chapter 5. Answer each question fully, showing work and giving written explanations with each problem. Spend at least one hour working independently on the questions before you share your ideas with a friend. You may not use the internet (except Desmos!) as a resource. Partial credit will be given for ideas not necessarily leading to a complete solution.

Throughout, a and b represent positive, non-one, real numbers.

1. For each pair of numbers, determine which of the two is greater. Do not use a calculator. (3 pts.)
 - a. $\log_5 11$ or 1.5
 - b. $\log_5 7$ or 1.2
2. Simplify $\frac{1}{\log_{1/a}(1/b)}$. (2 pts.)
3. The domain of the function $f(x) = \log_b x$ is the set of positive real numbers. Find the domain of $\log_2(\log_4(10x))$. (2 pts.)
4. Answer the following questions. Count carefully. (3 pts.)
 - a. For how many integers n is $3 < \log_3 n < 4$?
 - b. For how many integers n is $4 < \log_3 n < 5$?
 - c. For how many integers n is $5 < \log_3 n < 6$?
 - d. What pattern do you see? How can you see this pattern in the graph of $f(x) = \log_3 x$?