

College Algebra — Exam 4
MAT 140, Fall 2017 — D. Ivanišić

Name: _____
Show all your work!

1. (8pts) Evaluate without using the calculator:

$$\log_4 256 =$$

$$\log_3 \frac{1}{9} =$$

$$\log_a \sqrt[3]{a^5} =$$

$$\log_{b^2} b^{10} =$$

2. (4pts) Use the change-of-base formula and your calculator to find $\log_3 10$ with accuracy 6 decimal places. Show how you obtained your number.

3. (5pts) If $\log_a 3 = u$ and $\log_a 7 = v$, express in terms of u and v :

$$\log_a 49 =$$

$$\log_a \frac{\sqrt{3}}{7} =$$

4. (6pts) Write as a sum and/or difference of logarithms. Express powers as factors. Simplify if possible.

$$\log_5 \frac{125y^3}{\sqrt[5]{x^6}} =$$

5. (6pts) Write as a single logarithm. Simplify if possible.

$$2 \log_7(x^{-4}y^4) - 3 \log_7(x^2y^{-3}) =$$

6. (4pts) Simplify.

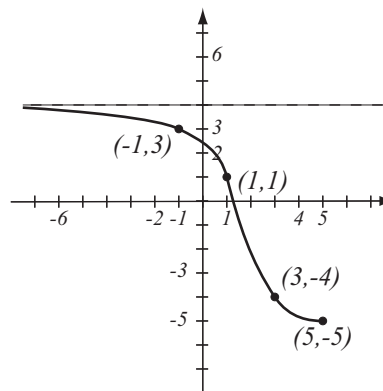
$$\log_8 8^{\sqrt{5}} =$$

$$e^{\ln(3-x^2)} =$$

7. (6pts) The graph of a function f is given.

a) Is this function one-to-one? Justify.

b) If the function is one-to-one, find the graph of f^{-1} , labeling the relevant points, and showing any asymptotes.



8. (8pts) Let $f(x) = 4 + \sqrt{x + 3}$.

a) Find the formula for f^{-1} .

b) Find the range of f^{-1} .

9. (6pts) Using transformations, draw the graph of $f(x) = -\ln(x + 3)$. Explain how you transform the graph of a basic function in order to get the graph of f . Indicate at least one point on the graph and any asymptotes.

10. (3pts) Find the domain of the function $f(x) = \log_{11}(3 - 5x)$ and write it in interval notation.

11. (8pts) How much should you invest in an account bearing 2.4%, compounded monthly, if you wish to have \$2,000 in four years?

Solve the equations.

Solve the equations.

12. (6pts) $25^{x+1} = \left(\frac{1}{5}\right)^{2x+4}$

13. (8pts) $3^{2x+1} = 4^{9-x}$

14. (10pts) $\log_3(x - 8) + \log_3(2x + 5) = 4$

15. (12pts) The population of Splodaton was 35,000 in 2009 and 42,000 in 2014. Assume that it has grown according to the formula $P(t) = P_0e^{kt}$.

a) Find k and write the function that describes the population at time t years since 2009. Graph it on paper.

b) Find the predicted population in the year 2019.

Bonus (10pts) Let $f(x) = \frac{e^x - 1}{e^x + 1}$.

a) Graph the function (sketch on paper!). Explain why it is one-to-one.

b) Find the formula for $f^{-1}(x)$.