

College Algebra — Exam 4
MAT 140C, Fall 2021 — D. Ivanišić

Name: _____
Show all your work!

1. (8pts) Evaluate without using the calculator. For each problem, write the question you should ask yourself in order to find the logarithms.

$$\log_2 32 = \qquad \log_3 \frac{1}{27} = \qquad \log_a \sqrt[5]{a^2} = \qquad \log_{a^2} a^6 =$$

2. (4pts) Use the change-of-base formula and your calculator to find $\log_7 9$ with accuracy 6 decimal places. Show how you obtained your number.

3. (5pts) If $\log_a 2 = u$ and $\log_a 3 = v$, express in terms of u and v :

$$\log_a 6 = \qquad \log_a \frac{2}{\sqrt{3}} =$$

4. (4pts) Simplify.

$$\log_6 6^{4x-3} = \qquad e^{\ln 3.1} =$$

5. (8pts) Convert equation into other form, logarithmic or exponential.

$$b = 12^3 \qquad \log_x 8 = 4$$

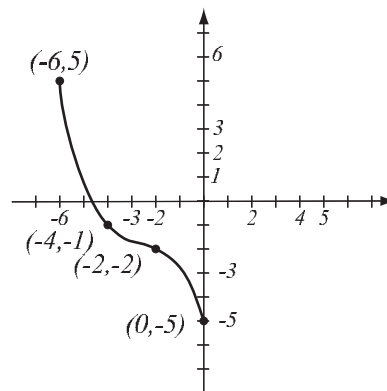
$$e^6 = m \qquad \log_6 d = \frac{1}{3}$$

6. (3pts) Find the domain of the function $f(x) = \ln(8-3x)$ and write it in interval notation.

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. (9pts) Let $f(x) = \frac{x+2}{x}$.

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

b) Find the range of f .

9. (6pts) Using transformations, draw the graph of $f(x) = e^{-x} - 2$. 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. (9pts) How much needs to be deposited in an account bearing 8.4% interest, compounded monthly, so that there is \$7,000 in the account after 5 years?

11. (12pts) Write as a sum and/or difference of logarithms. Express powers as factors. Simplify if possible.

$$\log_6(36x^4y^7) =$$

$$\log \frac{x^3\sqrt{y}}{1000x^7y^3} =$$

12. (12pts) Write as a single logarithm. Simplify if possible.

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

$$6\ln x - 2\ln(x^2 + 3x) + 4\ln(x + 3) =$$

13. (14pts) The population of Bloomville was 432,000 in 2015 and 610,000 in 2020. 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 2015. Graph it on paper.

b) How long will it take until population is 800,000?

Bonus (10pts) Let $f(x) = \frac{e^x - 3}{e^x + 2}$. Find the formula for f^{-1} . *Hint: solve for e^x first.*