College Algebra — Exam 4
MAT 140, Fall 2019 — D. Ivanšić

Name: _____

Show all your work!

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

$\log_2 32 =$ $\log_5 \frac{1}{25} =$ $\log_a \sqrt[3]{a^8} =$ $\log_{b^2} b^8 =$

2. (4pts) Use the change-of-base formula and your calculator to find $\log_8 75$ with accuracy 6 decimal places. Show how you obtained your number.

3. (5pts) If $\log_a 4 = u$ and $\log_a 9 = v$, express in terms of u and v:

$\log_a 36 =$ $\log_a \frac{81}{16} =$

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

$\log_3 \frac{27x^2}{\sqrt{y^5}} =$

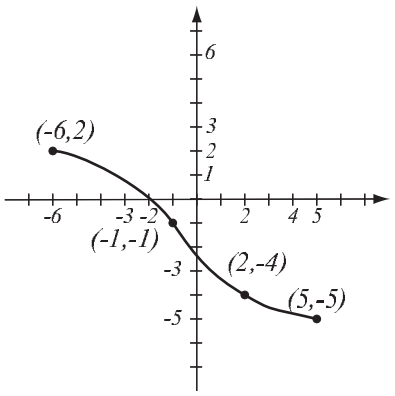
5. (6pts) Write as a single logarithm. Simplify if possible.

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

6. (4pts) Simplify.

$\log 10^{5-x} =$ $e^{\ln 5} =$

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 $f(x) = \dfrac{x}{2x-5}$.
a) Find the formula for f^{-1}.
b) Find the range of f.

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 $f(x) = \log(3 - 7x)$ and write it in interval notation.

11. (9pts) \$1800 is deposited in an account bearing 3.25% interest, compounded quarterly. How much is in the account after 4 years?

Solve the equations.

12. (6pts) $9^{4x+1} = 3^{x-7}$

13. (8pts) $4^{x+1} = 7^{x+3}$

14. (8pts) $3^{2x} - 7 \cdot 3^x - 18 = 0$

15. (12pts) Hydrogen-3, a radioactive isotope, decays over time. Starting with 200 grams of hydrogen-3, the amount of it left after t years is given by the function $A(t) = 200 \cdot 0.945^t$.
a) Graph the amount function.
b) How much hydrogen-3 is left after 6 and 20 years?
c) When will there be 10 grams of hydrogen-3 left?

Bonus (10pts) Let $f(x) = 1 + e^{4x-3}$.
a) Find the formula for f^{-1}.
b) Find the range of f.