

Autumn 2016

Name (Print): _____

Form A

Signature: _____

OSU name.#: _____

Lecturer: _____

Recitation Instructor: _____

Recitation Time: _____

Math 1148: Midterm Exam 3

Instructions:

- Show ALL work to receive full credit. Answers with insufficient supporting work will receive little or no credit.
- Please CIRCLE your answers
- If you find the solution to a problem using a graph from your calculator (*where allowed*), you need to sketch that graph and label all relevant information.
- The exam consists of 12 problems starting on page 2 and ending on page 6. Make sure your exam is not missing any pages before you start.

Some formulas that may be useful:

$$A = P \left(1 + \frac{r}{n} \right)^{nt}$$

$$A = Pe^{rt}$$

$$A = P(a)^t$$

$$A = P(1 + r)^t$$

Page	2	3	4	5	6	Total
Maximum Points	24	22	18	20	16	100
Student Score						

1. Given $f(x) = 7 - (5x - 2)^3$. Find the inverse function, $f^{-1}(x)$ (8 points)

2. Given $g(x) = \frac{7x+3}{5-2x}$. Find the inverse function, $g^{-1}(x)$ (8 points)

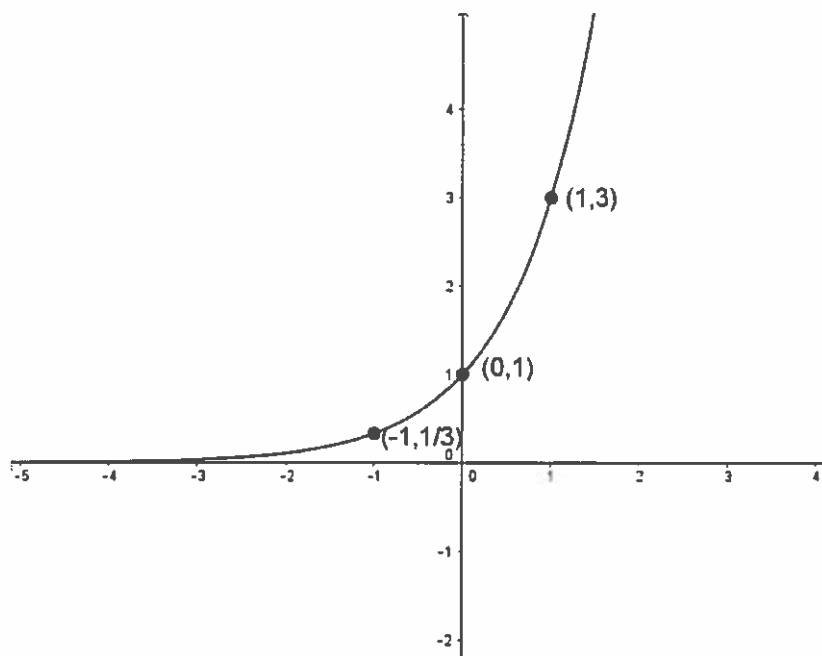
3. Determine which of the following four functions are one-to-one functions and which are not. Write "yes" if it is and "no" if not in the blank. (8 points)

$$m(x) = |3 + 5x| \quad \underline{\hspace{2cm}} \quad h(x) = x^3 - 2 \quad \underline{\hspace{2cm}}$$

$$n(x) = \frac{3}{x^2 + 5} \quad \underline{\hspace{2cm}} \quad g(x) = \frac{3}{x - 7} \quad \underline{\hspace{2cm}}$$

4. Bill invests \$2700 into an account that pays 3% interest compounded monthly. How much money will be in the account after 6 years? (8 points)
Round your answer to the nearest cent.
5. Suppose that instead of the account in Problem 4, Bill invests his \$2700 in an account that pays 3% annual interest, but it is compounded continuously. How much money would Bill have after 6 years with this account? (8 points)
Round your answer to the nearest cent.
6. Suppose Jill invests \$10,000 in an account that offers $r\%$ annual interest (compounded annually). If the investment increases to \$13,069.60 in 5 years, find the annual rate of interest. (6 points)
Round your answer to the nearest tenth of a percent.

7. Consider the graph of $f(x) = 3^x$ and the function $g(x) = 4 - 3^{x-2}$.
- List the transformations that take $f(x)$ to $g(x)$. (3 points)
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 - Plot $g(x)$ on the set of axes. (3 points)
 - Plot and label the three points on $g(x)$ that correspond to the three labeled points on $f(x)$. (3 points)
 - Draw and label the horizontal asymptote for $g(x)$. (1 point)



8. Suppose the population of a city has been growing steadily at an annual growth rate of 1.5%. The population is currently 170,000, estimate the population 6 years ago.
Round to the nearest person.

(8 points)

9. Evaluate the logarithm expressions. Show some explanation for your work, (no points for calculator answers without supporting work) (12 points)

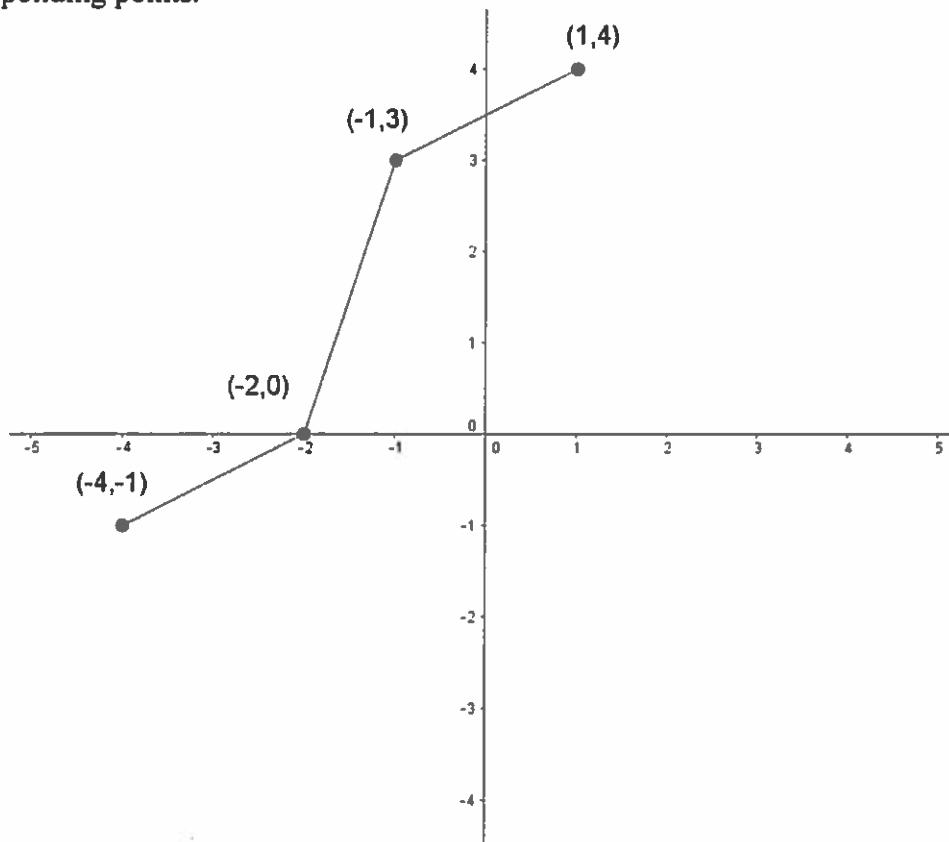
a. $\log_9\left(\frac{1}{81}\right)$

b. $\log_2(16^{30})$

c. $\log_4(\log_{49}(7))$

d. $\log(\log(10^{100000}))$

10. Consider the following function with domain $[-4,1]$. Draw the inverse function and label the corresponding points. (8 points)



11. Assuming x is in the domain, expand the expression below as much as possible.

(8 points)

$$\log\left(\frac{(x-2)^3\sqrt{x+2}}{(x-7)}\right)$$

12. Express as a single logarithm: $\frac{1}{2}\ln(3-x) - 5[\ln(4-x^2) + \ln(x+3)]$

(8 points)