

Name (Print): \_\_\_\_\_

Username.#: \_\_\_\_\_

Math 1130  
Spring 2019  
Sample Midterm 2a  
2/28/19

Lecturer: \_\_\_\_\_

Rec. Instructor: \_\_\_\_\_

Rec. Time: \_\_\_\_\_

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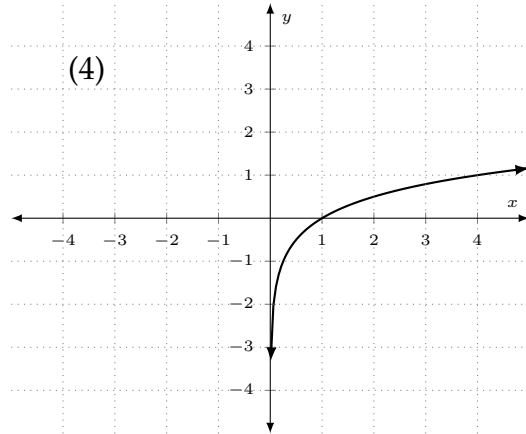
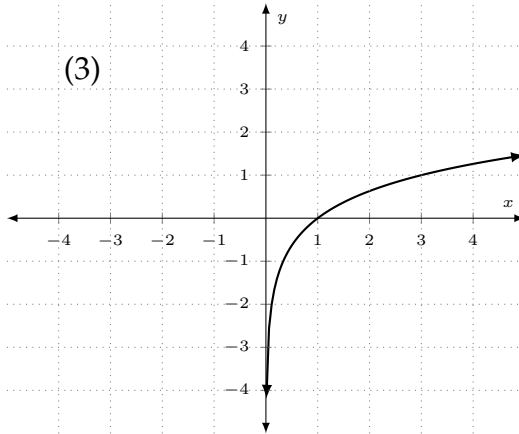
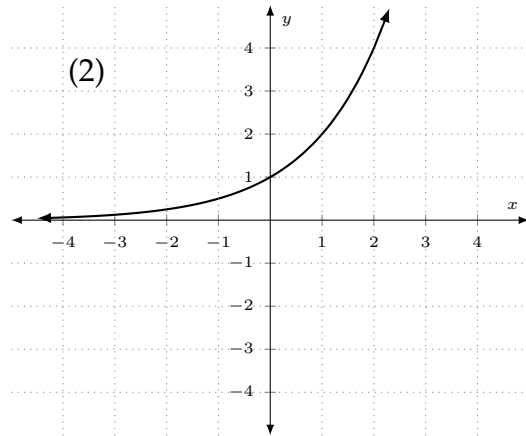
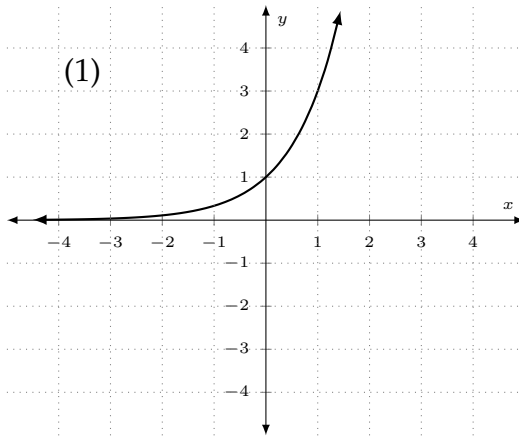
This exam contains 10 pages (including this cover page) and 9 problems. Check to see if any pages are missing. The exam is worth 100 points. The value of each question is listed below.

The following rules apply:

- You have **55 Minutes** to complete this exam.
- You may **not** use your books or notes on this exam.
- Please write clearly.
- **Partial Credit:** You are required to show your work on each problem of this exam. Incorrect answers with supporting work may receive partial credit. Any questions without supporting work will receive no credit. Partial credit might not be awarded on some questions.
- Calculators are permitted with the exception of calculators that have symbolic algebra or calculus capabilities. In particular, the following calculators (and their upgrades) are not permitted: TI-89, TI-92, TI-Nspire CX CAS, and HP-49. In addition, neither PDAs, laptops, nor cell phones are permitted.
- Unless otherwise specified, make sure your answers are in **exact form** (i.e. not a decimal approximation).
- Please write your answers in the boxes provided unless otherwise instructed.
- A random sample of graded exams will be copied before being returned.

Page	Points	Score
2	10	
3	10	
4	16	
5	16	
6	24	
7	12	
8	12	
Total:	100	

1. The graphs shown here (labeled (1)-(4)) satisfy certain characteristics. Use them to respond to the parts below.



- (a) (5 points) Graph (1) represents an exponential function. What is its base?

- (b) (5 points) Which two graphs above are inverse to one another?

2. (a) (7 points) Compute the inverse of the function.

$$f(x) = 4x^2 - 1, \text{ for } x \geq 1.$$

$$f^{-1}(x) =$$

- (b) (3 points) What is the range of your result from the previous part?

The range is

3. (10 points) Thorium-233 has a half life of 22 minutes. A scientist has 529 grams of Thorium-233; the decay function is

$$f(t) = 529 \cdot \left(\frac{1}{2}\right)^{\frac{t}{22}}.$$

How long will it take for the scientist's Thorium-233 to decay to 200 grams? Give your answer in minutes rounded to one decimal place.

$$t = \boxed{\phantom{0000}}$$

4. (6 points) Use properties of logarithms and exponentials to evaluate the expression

$$\log_2 \ln e^{16}$$

Your answer should be a whole number. No credit will be awarded for calculator answers!

$$\log_2 \ln e^{16} = \boxed{\phantom{0000}}$$

5. Use properties of logarithms to solve the following parts.

(a) (8 points) Determine all values  $x$  that satisfy the equation:

$$\log_9(5 + x) + \log_9(7 - x) = \log_9 32$$

$$x = \boxed{\phantom{0000}}$$

(b) (8 points) Rewrite the given expression in terms of  $\ln x$ ,  $\ln y$  and  $\ln z$ .

$$\ln \frac{x^3}{y^2 \sqrt[5]{z}}$$

$$\ln \frac{x^3}{y^2 \sqrt[5]{z}} = \boxed{\phantom{0000000000}}$$

6. (a) (8 points) \$805 is deposited into an account today. The account earns a nominal rate of interest of 8.6% compounded monthly. How much is in the account after 2.25 years? Give your answer to two decimal places.

The account balance is

- (b) (8 points) You deposit money into an account today so that you have \$700 in the account in 4 years. The annual rate of interest is 9.2% compounded continuously, how much must you deposit today? Give your answer to two decimal places.

The deposit is

7. (8 points) What is the effective rate of interest that is equivalent to a nominal rate of interest of 6.5% compounded quarterly? Give your answer as a percent rounded to two decimal places (for example, your answer should look like 1.27%).

The effective rate of interest is

8. (a) (6 points) Two numbers sum to 90. Write the product of the two numbers as a quadratic function  $f(x)$ .

$$f(x) = \boxed{\phantom{000000}}$$

- (b) (6 points) Determine the maximum of the function in part (a) using the vertex. Calculator solutions will receive no credit.

The maximum is

9. (a) (8 points) You wish to have \$20,000 in 5 years. To attain your financial goal, you deposit \$ $x$  today and \$10,000 in one year into an account that earns 8% interest, compounded annually. What is your deposit today? Round your answer to two decimal places.

$$x = \boxed{\phantom{000000}}$$

- (b) (4 points) Use \$4350 as your initial deposit from part (a). After 1 year, the account begins paying 9% interest, compounded annually. How much do you have at the end of the fifth year assuming that you still made the \$10,000 deposit? Round your answer to two decimal places.

At the end of the fifth year, I have



Scrap work

## Some Useful Formulas

$$S = P(1 + r)^n$$

$$S = Pe^{rt}$$

$$P = S(1 + r)^{-n}$$

$$P = Se^{-rt}$$

$$r_e = \left(1 + \frac{r}{n}\right)^n - 1$$

$$r_e = e^r - 1$$