Name (Print): _____

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Lecturer: _____

Rec. Instructor: _____

Rec. Time: _____

Math 1130
Autumn 2015
Exam 2 - Form A
10/29/15

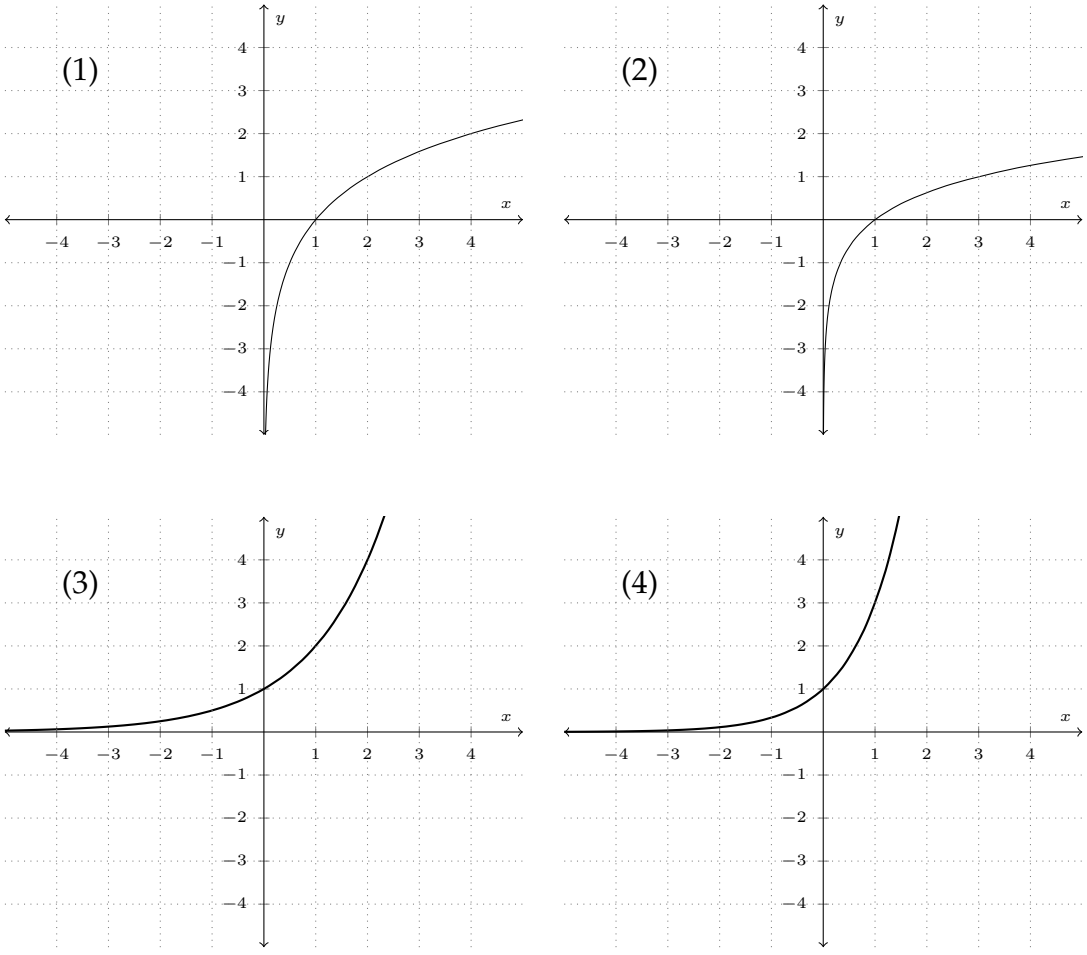
This exam contains 10 pages (including this cover page) and 7 problems. Check to see if any pages are missing. The exam is worth 100 points. The value of each question is listed below.

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, 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.

Question	Points	Score
1	12	
2	16	
3	12	
4	13	
5	20	
6	16	
7	11	
Total:	100	

1. The graphs shown here (labeled (1)-(4)) satisfy certain characteristics. Match the description given in each part with one of the graphs shown here. Graphs may be used more than once.



(a) (4 points) This graph is an exponential with base 2. This best describes graph $\square$

(b) (4 points) This graph is a logarithm with base 3. This best describes graph $\square$

(c) (4 points) This graph most resembles the inverse of graph (2). This best describes graph $\square$

2. Circle the best choice available for the following multiple choice questions.

(a) (4 points) Suppose that $\log_b x = 5$. Then $x =$

(i) x^5 (ii) b^5 (iii) 5 (iv) 5^b

(b) (4 points) Which of the following represents the solution(s) to the equation

$$\log(x+1) + \log(x+2) = \log 6$$

(i) $x = -4$ (ii) $x = 1$ (iii) $x = -4, 1$ (iv) No Solution

(c) (4 points) The effective rate that is equivalent to an annual (nominal) rate of $r = 0.09$ compounded quarterly is

(i) $r_e = 0.093$ (ii) $r_e = 0.092$ (iii) $r_e = 0.091$ (iv) $r_e = 0.090$

(d) (4 points) What is the present value of $\$250$ due after 5 years if the interest rate is 7% compounded annually?

(i) $\$176.35$ (ii) $\$176.71$ (iii) $\$177.23$ (iv) $\$178.25$

3. Determine the values of x in each of the following parts. Make sure to show the properties of logarithms that you use in part (c)!

   (a) (3 points) If $x = \ln e^4$, then $x =$

   (i) 0 (ii) 1 (iii) 3 (iv) 4

   (b) (3 points) If $x = \log_3 81 - \log_4 4$, then $x =$

   (i) 1 (ii) 2 (iii) 3 (iv) 4

   (c) (6 points) If $\log_x(8x + 9) = 2$, then $x =$

   (i) -6 (ii) -1 (iii) 4 (iv) 9

4. (a) (8 points) Use properties of logarithms to write the following expression in terms of $\ln x$, $\ln y$, and $\ln z$:

$$\ln\left(\sqrt[3]{\frac{x^3 z}{y}}\right)$$

$$\ln\left(\sqrt[3]{\frac{x^3 z}{y}}\right) = \boxed{}$$

(b) (5 points) Determine the numerical value of the expression

$$\ln(x^2) + 2\ln(y^3) - 3\ln z,$$

given that $\ln x = 0.5$, $\ln y = 1$, and $\ln z = 2$.

The expression $= \boxed{}$

5. In the parts (a) and (b) you must write the formula you use in the space provided.

   (a) (10 points) What annual (nominal) rate of interest r, compounded semiannually, corresponds to an effective rate of 6%? Express your answer as a *percent* rounded to *two decimal places*.

$r =$ ____

   (b) (10 points) How many years, t (rounded to two decimal places), will it take for $\$700$ to accumulate to $\$1750$ at an annual (nominal) rate of 4% compounded quarterly?

$t =$ ____

6. In parts (a) and (b) you must write the formula you use in the space provided.

   (a) (8 points) The principal of an account is $\$4000$. The account will double in value in nine years. The interest rate of the account, r, is compounded continuously. Express the value of r as a percent rounded to *one decimal place*.

$r =$ [ ]

   (b) (8 points) The population of Columbus is estimated to be $1,000,000$ on January 1, 2020. You wish to estimate the population, p, of Columbus on January 1, 2015. You assume that the growth rate of the population is 4% every year. What is your estimate of the population rounded to *the nearest person*?

$p =$ [ ]

7. (11 points) A debt of $\$1000$ in four years and $\$1500$ in five years is to be repaid with a payment of $\$500$ today and a second payment, x, in two years. If the interest rate is 9% compounded annually, how much is the final payment? Round your answer to *the nearest penny*.

$x =$ _____

Some Useful Formulas

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

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

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

$$S = Pe^{rt}$$

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

$$r_e = e^r - 1$$

Scrap work