Name (Print): _____

Username.#: _____

Lecturer: _____

Rec. Instructor: _____

Rec. Time: _____

Math 1130
Spring
Sample Midterm 2a

This exam contains 8 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.
- You are required to show your work on Problems 4, 5, 6 and 7.
  No work is required for Problems 1, 2, or 3.
- **Partial Credit**: Incorrect answers with supporting work may receive partial credit.
  Problems 4, 5, 6 and 7 will receive no credit if there is no supporting work.
  Partial credit will not be awarded on Problems 1, 2, or 3.
- Calculators are permitted except for 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, you may not use PDAs, laptops, or cell phones.
- Unless otherwise specified, write your answers 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	15	
3	15	
4	17	
5	27	
6	26	
Total:	100	

1. For each of the following multiple choice questions, **circle the correct answer**. You do **not** need to show your work.

   (a) (5 points) Solve for x in the equation below.

   $$\log(2 - x) = -1$$

   (a) $x = -8$ (b) $x = 1.63$ (c) $x = 1.9$

   (d) $x = 3$ (e) $x = 12$ (f) None of the above

   (b) (5 points) A certificate of deposit is purchased for \$2000. If the certificate earns interest at a rate of 3%, compounded continuously, what is the value of the certificate at the end of 4 years?

   (a) \$1773.84 (b) \$1776.97 (c) \$2240.00

   (d) \$2251.02 (e) \$2254.99 (f) None of the above

   (c) (5 points) A one-to-one function has domain $[-4, 6]$ and range $[2, 10]$. What is the range of the inverse function $f^{-1}(x)$?

   (a) $\left[\frac{-1}{4}, \frac{1}{6}\right]$ (b) $[-4, 6]$ (c) $\left[\frac{1}{10}, \frac{1}{2}\right]$

   (d) $[2, 10]$ (e) $[-6, 4]$ (f) $[-10, -2]$

   (g) None of the above

2. For each of the following multiple choice questions, **circle the correct answer**. You do **not** need to show your work.

(a) (5 points) Suppose \$4000 is invested at an annual rate of 7%, compounded quarterly. Find the compound amount after 6 years, rounded to the nearest cent.

(a) \$4438.81 (b) \$6002.92 (c) \$6065.77

(d) \$6087.85 (e) \$20289.47 (f) None of the above

(b) (5 points) Consider the function

$$h(x) = -2x^2 + 3x - 1$$

Which of the following statements is true?

(a) $h(x)$ has a maximum at the vertex whose x-coordinate is $x = \frac{1}{3}$.

(b) $h(x)$ has a minimum at the vertex whose x-coordinate is $x = \frac{1}{3}$.

(c) $h(x)$ has a maximum at the vertex whose x-coordinate is $x = \frac{3}{4}$.

(d) $h(x)$ has a minimum at the vertex whose x-coordinate is $x = \frac{3}{4}$.

(e) None of the above statements is true.

(c) (5 points) An investment earns interest at a nominal rate of 7%, compounded monthly. Find the effective rate as a percent, rounded to two decimal places.

(a) 6.77% (b) 6.78% (c) 7.00%

(d) 7.23% (e) 7.25% (f) None of the above

3. For each of the following multiple choice questions, **circle the correct answer**. You do **not** need to show your work.

   (a) (5 points) Which of the following logarithmic equations corresponds to

   $$x = y^2\,?$$

   (a) $\log_2(y) = x$ (b) $\log_2(x) = y$ (c) $\log_y(2) = x$

   (d) $\log_y(x) = 2$ (e) $\log_x(y) = 2$ (f) None of the above

   (b) (5 points) A debt of \$800 is due in 6 years. The interest rate is 6%, compounded annually. Find the present value of the debt, rounded to the nearest cent.

   (a) \$558.14 (b) \$563.97 (c) \$588.24

   (d) \$1134.82 (e) \$1146.66 (f) None of the above

4. (7 points) Use the properties of logarithms and exponentials to evaluate the expression

   $$\log_3 9^{0.7}$$

   No credit for solutions by calculator.

$\log_3 9^{0.7} =$ [ ]

5. Solve the equations. Show all of your work. **Solutions by calculator will receive no credit.**

   (a) (10 points) $\log_x(2x + 15) = 2$

   $x =$ [ ]

   (b) (10 points) $\log(x - 1) + \log(x + 2) = 1$

   $x =$ [ ]

6. (7 points) You are given that

   $$\log x = -2 \qquad \log y = 3 \qquad \log z = -4$$

   Compute

   $$\log\left(\frac{x^3 \cdot y^2}{z}\right)$$

   $$\log\left(\frac{x^3 \cdot y^2}{z}\right) =$$ [ ]

7. Solve the following interest theory questions. Show all of your work.

   (a) (10 points) Suppose \$300 is deposited into an account that earns interest at an effective interest rate of 7%. Find the time t (in years) at which the value of the account is \$500. Round t to two decimal places (e.g. 12.34 years). **Write the formula that you use to calculate t.**

   $t =$ [ ]

   (b) (8 points) An investment earns interest at a nominal interest rate of 5% compounded quarterly. Today, \$10,000 is invested. In the first year, what amount of (compound) interest does the account accumulate? Write your answer rounded to two decimal places (e.g. \$12.34). **Write the formula that you use to calculate your answer.**

   Answer = [ ]

   (c) (8 points) A debt of \$700 is due in 6 years. The present value of the debt is \$450. Interest is charged at a rate of r compounded continuously. Write r as a percent rounded to two decimal places (e.g. 12.34%). **Write the formula that you use to calculate r.**

   $r =$ [ ]

Scrap work

Some Useful Formulas

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

$$S = Pe^{rt}$$

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

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

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

$$r_e = e^r - 1$$