

Name (Print): _____

Username.#: _____

Math 1130
Autumn 2018
Sample Midterm 2c
2/28/19

Lecturer: _____

Rec. Instructor: _____

Rec. Time: _____

This exam contains 8 pages (including this cover page) and 6 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, and 6.
No work is required for Problems 1, 2, or 3.
- **Partial Credit:** Incorrect answers with supporting work may receive partial credit.
Problems 4, 5, and 6 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	20	
3	15	
4	15	
5	26	
6	24	
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) A certificate of deposit is purchased for \$4000. If the certificate earns interest at a rate of 3%, compounded monthly, what is the value of the certificate at the end of 4 years?

- (a) \$4040.15 (b) \$4502.04 (c) \$4509.31
(d) \$4121.66 (e) \$16529.01 (f) None of the above

(b) (5 points) Find the inverse function f^{-1} to the function f given below with the specified restriction.

$$f(x) = (4x - 3)^2 \quad \text{for } x \geq \frac{3}{4}$$

- (a) $f^{-1}(x) = \sqrt{4x - 3}$ (b) $f^{-1}(x) = \frac{\sqrt{x+3}}{4}$ (c) $f^{-1}(x) = 8(4x - 3)$
(d) $f^{-1}(x) = \frac{1}{(4x-3)^2}$ (e) $f^{-1}(x) = \frac{x+3}{4}$ (f) None of the above

(c) (5 points) Which of the following equations is equivalent to

$$\log_2(x) = y?$$

- (a) $2^x = y$ (b) $y^x = 2$ (c) $x^y = 2$
(d) $x^2 = y$ (e) $2^y = x$ (f) None of the above

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

- (a) \$2628.19 (b) \$2665.37 (c) \$4290.03
(d) \$6002.92 (e) \$6087.85 (f) 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) Solve for x in the equation below.

$$\log_3(x + 2) = -1$$

- (a) $x = -2$ (b) $x = \frac{-17}{9}$ (c) $x = \frac{-5}{3}$
(d) $x = 1$ (e) $x = 7$ (f) None of the above

(b) (10 points) For both of the following parts, consider the function

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

i. The vertex is

- (a) $(-1.5, -2)$ (b) $(-0.75, -3.125)$ (c) $(-0.333, -2.778)$
(d) $(1.5, 7)$ (e) $(0.75, 1.375)$ (f) $(0.333, 0.778)$
(g) None of the above

ii. Find all x -intercepts. *You may need to circle more than one*

- (a) -4 (b) -2 (c) -0.5
(d) 4 (e) 2 (f) 0.5
(g) 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) Solve for x in the equation below.

$$\log_4(x - 3) = 1 + \log_4(2)$$

- (a) $x = 5$ (b) $x = 6$ (c) $x = 8$
(d) $x = 9$ (e) $x = 11$ (f) None of the above

(b) (5 points) An investment earns interest at a nominal rate of 3%, compounded semiannually. Find the effective rate as a percent, rounded to two decimal places.

- (a) 1.50% (b) 2.96% (c) 3.00%
(d) 3.02% (e) 6.09% (f) None of the above

(c) (5 points) A debt of \$800 is due in 5.5 years. The interest rate is 9%, compounded monthly. Find the present value of the debt, rounded to the nearest cent.

- (a) \$488.56 (b) \$498.02 (c) \$535.12
(d) \$767.79 (e) \$1309.98 (f) None of the above

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

(a) (10 points) $\log_x(3x - 8) = 1$

$x =$

(b) (10 points) $\ln(x - 2) + \ln(2x + 1) = \ln(7)$

$x =$

5. (6 points) Express the following as a single logarithm:

$$\frac{1}{3} \ln(x) + 3 \ln(x^2) - 3 \ln(x - 2) - 3 \ln(x - 4)$$

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

- (a) (8 points) Suppose \$500 is deposited into an account that earns interest at a rate of 7%, compounded continuously. Find the time t (in years) at which the value of the account is \$900. Round t to two decimal places (e.g. 12.34 years).

$$t = \boxed{}$$

- (b) (8 points) An investment earns interest at an effective rate of 7%. Find the nominal rate if interest is compounded monthly. Write your answer as a percent rounded to two decimal places (e.g. 12.34%).

$$\text{Answer} = \boxed{}$$

- (c) (8 points) A debt of \$800 is due in 8 years. The present value of the debt is \$500. Find the effective rate of interest r . Write r as a percent rounded to two decimal places (e.g. 12.34%).

$$r = \boxed{}$$

Scrap work

Some Useful Formulas

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

$$S = Pe^{rt}$$

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

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

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

$$r_e = e^r - 1$$

$$A = Ra_{\overline{n}|r} = R \cdot \left[\frac{1 - (1 + r)^{-n}}{r} \right]$$

$$R = \frac{A}{a_{\overline{n}|r}} = A \cdot \left[\frac{r}{1 - (1 + r)^{-n}} \right]$$

$$S = Rs_{\overline{n}|r} = R \cdot \left[\frac{(1 + r)^n - 1}{r} \right]$$

$$R = \frac{S}{s_{\overline{n}|r}} = S \cdot \left[\frac{r}{(1 + r)^n - 1} \right]$$