

Math 1070 Uniform Final Exam
May 5, 2007

Print your name: _____

Circle your section below.

Tocheri	Lana	Lana
001	002	003
MW 8:30 AM	TR 10:00 AM	MW 11:30 AM

Instructions:

- Put your name on this page and on the next page.
- Circle your section number above.
- The exam is closed notes and closed book. A sheet of formulas is provided at the end of the exam. **CALCULATORS ARE ALLOWED.**
- Answer each question in the space provided. Show your work when possible. Partial credit is possible on some questions, but only if you show your work.
- You may not communicate with anyone other than the instructor during the exam. The instructor may help to clarify the meaning of a question but is not allowed to give you hints, verify formulas, or tell you if you have done the problem correctly.
- Be neat. If the grader cannot understand what you have written, you will not receive credit.

DO NOT WRITE BELOW THIS LINE

Page 1 (10 pts) _____

Page 2 (12 pts) _____

Page 3 (15 pts) _____

Page 4 (20 pts) _____

Page 5 (18 pts) _____

Page 6 (14 pts) _____

Page 7 (14 pts) _____

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Page 11 (11 pts) _____

Total (150 pts) _____

Name _____

Basic Algebra

1. (2 points each) Simplify each expression.

a. $2(2x + 1)^2 - (2x + 5)$

b. $\frac{2}{x^2 - 4x + 4} - \frac{1}{x - 2}$

2. (2 points each) Simplify. Write your answer with all positive exponents.

a. $\frac{6st^{-4}}{2s^{-2}t^{-2}}$

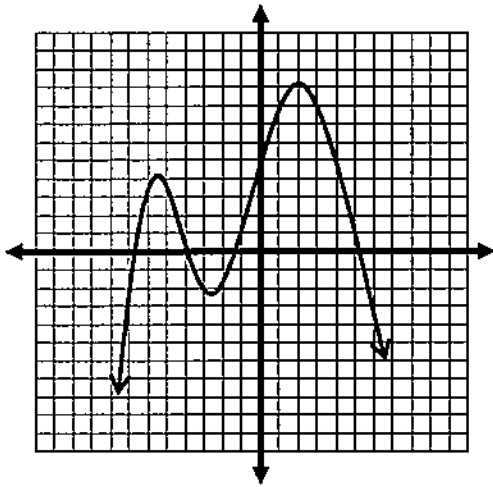
b. $(-2a^{-2}b^4)^{-2}$

3. (2 points) Factor Completely: $4x^3 - 8x^2 - 12x$

Elementary Functions

4. (2 points each) Indicate whether each graph represents the graph of a function. Circle the appropriate answer below. Briefly explain, in one sentence or less, why you know that your answer is correct.

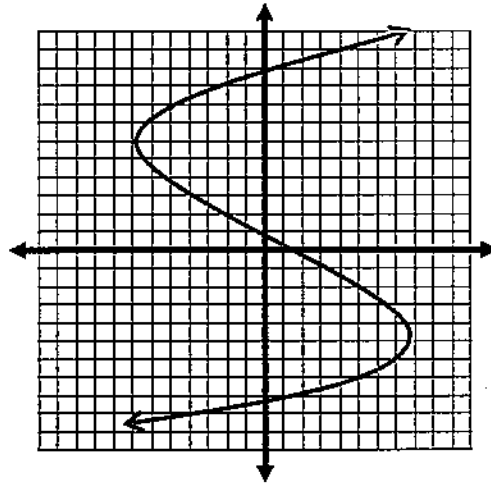
a.



Circle One: **Function** **Not a Function**

Explain:

b.



Circle One: **Function** **Not a Function**

Explain:

5. (2 points each) Find the domain of each function. Write your answer using interval notation.

a. $f(x) = \frac{x+2}{x^2-9}$

b. $g(x) = \frac{2}{\sqrt{3x+6}}$

6. (2 points each) Let $f(x) = -3x+9$. Find each of the following and simplify each answer.

a. $f(2)$

b. $\frac{f(x+h)-f(x)}{h}$

7. (2 points each) Given the price demand function $p(x) = 100 - 2x$; for $1 \leq x \leq 20$.
- Write the revenue function $R(x)$. Simplify.
 - If the cost is given by $C(x) = 50 + 8x$, write the Profit function $P(x)$. Simplify.
8. (2 points) Find the slope and y-intercept of $4x + 3y = 12$.
9. (2 points) Find the x and y intercepts of $2x - 5y = 10$.
10. At a price of \$4.00, the supply of soybeans is 6 bushels, while the demand is 11 bushels. When the price increases to \$6.00, the supply increases to 10 bushels while the demand decreases to 5 bushels.
- (2 points) Find the price-supply equation.
 - (2 points) Find the price-demand equation.
 - (3 points) Find the equilibrium point. Write your answer as an ordered pair of numbers. Show your work.

11. Given the function $f(x) = x^2 + 2x - 2$

- a. (2 points) Find the vertex of the function.

- b. (2 points) Find the x-intercepts

- c. (2 points) Find the y-intercept

- d. (2 points) Find the interval(s) where $f(x)$ is increasing

- e. (2 points) Find the interval(s) where $f(x)$ is decreasing

- f. (4 points) Sketch a graph of $y = f(x)$. Label at least 4 points including any intercepts.

Additional Elementary Functions

12. (2 points each) Given $f(x) = (x + 2)(x - 3)(x + 1)$.

- a. What is the degree of the function?

- b. Find the y-intercept algebraically.

- c. Find any x-intercepts algebraically.

13. Given $g(x) = \frac{3x+4}{x+2}$.

- a. (2 points) What is the domain of the function?
- b. (2 points) Find the y -intercept algebraically.
- c. (2 points) Find any x -intercepts algebraically.
- d. (2 points) Find any vertical asymptotes.
- e. (2 points) Find any horizontal asymptotes.
- f. (4 points) Sketch a graph of the function $y = g(x)$. Sketch and label the asymptotes and label any x -intercepts and y -intercepts..

14. (2 points each) Rewrite in exponential form

a. $\log_3 27 = 3$

b. $\ln e = 1$

15. (2 points each) Rewrite in logarithmic form.

a. $16^{\frac{1}{2}} = 4$

b. $3^0 = 1$

16. (2 points each) Evaluate the following logarithmic expressions.

a. $\log_3 9$

b. $\ln e^3$

17. (2 points each) Solve for x .

a. $\log_b(x-3) + \log_b x = 2\log_b 2$

b. $\log_2\left(\frac{1}{8}\right) = x$

Sequences and Series

18. (2 points) Write the first four terms of the sequence with general term $a_n = \frac{(-1)^n}{n^2}$.

19. (2 points each) Find the general term of a sequence whose first four terms are given.

a. 2, 4, 8, 16, ...

b. 1, 3, 5, 7, ...

20. (2 points) Write the series in expanded form and evaluate $\sum_{k=2}^5 (2k + 1)$.

Mathematics of Finance

In the next four problems you need to solve for the variable by hand and evaluate using your calculator.

21. (4 points) A loan of \$5,000 was repaid at the end of 6 months with a check for \$5250. What simple annual interest rate was charged?

22. (4 points) How long will it take money to double if it is invested at 6% compounded semiannually?

In the next two problems you need to solve for the variable by hand and evaluate using your calculator.

23. (4 points) How much do you need to invest now to have \$100,000 in 10 years if it is invested in an account that receives 5% compounded continuously? Round your answer to the nearest \$0.01.

24. (4 points) A man wishes to save for a car. He decides that he will invest quarterly into an account that receives 8% compounded quarterly. How much should he deposit quarterly to have \$30,000 in 5 years for his car? Round your answer to the nearest \$0.01.

Systems of Linear Equations and Matrices

25. (4 points) Solve the following system of equations by your choice of either the substitution method or the elimination method. Show all work.

$$\begin{cases} -x + y = 2 \\ 4x - 3y = -3 \end{cases}$$

26. (6 points) Solve the system of equations by Gauss-Jordan elimination using augmented matrices. Show all steps and identify the row operations that you use.

$$\begin{cases} 2x - y = 3 \\ x + 3y = 5 \end{cases}$$

27. (2 points each) Given $A = \begin{bmatrix} -2 & 2 \\ 1 & -3 \\ -2 & 0 \end{bmatrix}$, $B = \begin{bmatrix} -3 & 4 \\ 0 & -1 \end{bmatrix}$, $C = \begin{bmatrix} -2 & 4 \\ -3 & 1 \end{bmatrix}$.

- If possible find $C - 2B$ by hand. Show your work. If this is not possible explain why not.

- If possible find AB by hand. Show your work. If this product is not possible to calculate, explain why not.

28. (4 points) A street vendor sells bags of popcorn and pretzels. A bag of popcorn sells for \$2.00 and pretzels sell for \$1.50 each. On a particular afternoon the vendor sold 52 items and had revenue of \$93.00. How many bags of popcorn and how many pretzels did the vendor sell? Set up the linear system that represents this problem and solve it by your choice of methods. Show your work.

Sets and Counting

29. (2 pts. each) Given $A = \{3, 6, 9\}$, $B = \{3, 4, 5, 6, 7\}$, $C = \{4, 5, 7\}$, and $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$ find each of the following.

a. $A \cup B =$	b. $A \cap C =$
c. $C' =$	d. $(A \cap B)' =$

30. (2 points) A particular new car is available with 5 choices of color, 2 choices of transmission, 2 types of interior and 2 types of engine. How many different variations of this model car are possible? Show work and write your answer as a whole number.

Formula Sheet

Simple Interest Formulas:

$$I = Prt$$

$$A = P + Prt$$

Compound Interest Formula:

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

Continuous Compound Interest Formula

$$A = Pe^{rt}$$

Future Value of an Ordinary Annuity:

$$FV = PMT \frac{\left(1 + \frac{r}{m}\right)^{mt} - 1}{\frac{r}{m}}$$

Properties of Logarithmic Functions:

$$\log_b x = y \text{ if and only if } b^y = x$$

$$\log_b(MN) = \log_b(M) + \log_b(N) \quad \log_b\left(\frac{M}{N}\right) = \log_b M - \log_b N \quad \log_b M^p = p \log_b M$$

Combinations and Permutations:

$$\text{Combinations: } {}_n C_r = \frac{n!}{r!(n-r)!}$$

$$\text{Permutations: } {}_n P_r = \frac{n!}{(n-r)!}$$