Math 1051 Fall 2007 Final Exam on Sullivan 8th edition Chapters A, 1, 2, 3, 4, and 5  page 1 of 13

PRINT Name: _______________________________ UM ID: __________ HW ID: ______

Discussion section #: ______ Discussion Leader Name: ______________________________

Multiple Choice Total Points: __ out of 65

Free Response Total Points: __ out of 60

Total Points: ___ out of 125 = ___%

Sign your name below to certify that you did this exam by yourself:

Signature: ________________________________________________________________

This booklet contains 13 pages, including this cover page. Check to see if any are missing.

While doing this test, you may not use books or notes or any electronic device other than a scientific calculator.

Instructions for the machine-graded part of the test:

You MUST use a soft pencil (No. 1 or No. 2) to answer this part. Do not fold or tear the answer sheet. **DO NOT MAKE ANY STRAY MARKS ON THE ANSWER SHEET.** When you have decided on a correct answer, circle the answer in this booklet and blacken completely the corresponding circle on the answer sheet. If you erase something, do so completely. Each question has a correct answer. If you give two different answers, the question will be marked wrong. There is no penalty for guessing. Each problem is worth 5 points and there is no partial credit for this part of the test.

Note that either you or the School of Mathematics may request a re-grade of the machine graded part of this test. All re-grades will be based on responses in this test booklet and not on the machine graded response sheet. Any problem for which the answer is not indicated in the test booklet, or which has no relevant accompanying calculations will be marked wrong on the re-grade. Therefore work and answers must be clearly shown in this test booklet.

Instructions for the hand-graded part of the test:

**SHOW ALL WORK.** Unsupported answers will receive no credit. Partial credit is possible.

After you finish both parts of the exam:

Place the answer sheet between two pages of this booklet (make a sandwich), with the side marked "GENERAL PURPOSE ANSWER SHEET" facing DOWN. Have your ID card in your hand when turning in your exam.
For the multiple choice part of the test, work each problem in the space provided, circle the letter of your answer on this test paper, and then fill in the appropriate circle on the answer sheet.

1. Find the center of the circle \( x^2 + y^2 - 6x + 2y - 6 = 0 \)
   a. \((3, -1)\)
   b. \((2, 4)\)
   c. \((-3, 2)\)
   d. \((1, 3)\)
   e. \((-4, 1)\)

2. Combine into a single fraction and simplify: \( \frac{2x}{x^2 - 3x} - \frac{3}{x^2 - 9} \). The numerator of the resulting fraction is which of the following:
   a. \(2x + 3\)
   b. \(3x - 2\)
   c. \(2x^2 + 3x\)
   d. \(2x^2 + 3x - 1\)
   e. \(2x^2 + 6x - 3\)
3. Solve: \(-6 = x^2 - 5x\) Then, add the solutions to get one of the following:
   a. \(-2\)
   b. \(-3\)
   c. 2
   d. 5
   e. 6

4. Simplify and write with positive exponents only:
   \[
   \frac{2x^{3/2}(8x^{-1/2})^{1/3}}{4x^{-\frac{1}{2}}}
   \]
   The exponent of the \(x\) is which of the following?
   a. \(2/3\)
   b. \(5/6\)
   c. \(3/2\)
   d. \(11/6\)
   e. \(1/3\)
5. Solve $4^x - 8 \cdot 2^x = -15$ and round your answers to two decimal places. Now, add the solutions to get one of the following.
   a. 0.98
   b. 1.15
   c. 2.32
   d. 2.58
   e. 3.90

6. Find the domain of $f(x) = \frac{2\sqrt{2x+8}}{x^2+5x-14}$
   a. $\{x \mid x \leq 4, x \neq 2\}$
   b. $\{x \mid x \geq 4, x \neq 2, x \neq -7\}$
   c. $\{x \mid x \neq 4, x \neq 8\}$
   d. $\{x \mid x \neq 0\}$
   e. $\{x \mid x \geq -4, x \neq 2\}$
7. Solve \( \frac{x-4}{x+2} \leq 2 \).
   a. \( x \leq -2 \) or \( x \geq 4 \)
   b. \( x \leq -8 \) or \( x \geq -2 \)
   c. \( x \leq -6 \) or \( x \geq 2 \)
   d. \( x \leq -4 \) or \( x \geq 2 \)
   e. \( x \leq -8 \) or \( x > 0 \)

8. The function \( f(x) = \frac{3x}{x+5} \) is one-to-one. Find the inverse, \( f^{-1}(x) \).
   a. \( f^{-1}(x) = \frac{-5x}{x-3} \)
   b. \( f^{-1}(x) = \frac{x-3}{5x} \)
   c. \( f^{-1}(x) = \frac{1}{3x} \)
   d. \( f^{-1}(x) = \frac{x+5}{3x} \)
   e. \( f^{-1}(x) = \frac{5x}{x+3} \)
9. Solve: $8^{2x-3} = \frac{1}{16^{x+2}}$.
   a. 2
   b. 5
   c. 1/2
   d. 17/2
   e. 1/10

10. Solve: $2 \cdot \log_3 (x + 4) = 2 + \log_3 (9)$.
   a. -1
   b. 0
   c. 2
   d. 5
   e. 6
11. How much should you invest to get $1,000 at the end of 18 months if the investment is compounded quarterly for 18 months at 4%? Round your answer to the nearest dollar.
   a. 882
   b. 898
   c. 912
   d. 935
   e. 942

12. The expression \( \log_3 2x - \log_9 x \) can be written as which of the following:
   a. \( \log_3 2\sqrt{x} \)
   b. \( \log_3 2 \)
   c. \( \log_3 x \)
   d. \( \log_2 2x^2 \)
   e. \( \log_9 x \)
13. Write in simplest form: \( 5x \cdot \sqrt[3]{54xy} + \sqrt[3]{16x^4y} \)
   
   a. \( 10x \cdot \sqrt[3]{2xy} \)
   
   b. \( 17x \cdot \sqrt[3]{2xy} \)
   
   c. \( 7x \cdot \sqrt[3]{xy} \)
   
   d. \( xy \cdot \sqrt[3]{x^5y^2} \)
   
   e. \( 9x \cdot \sqrt[3]{xy} \)
For the free response part of the test, work the problem in the space provided on this test and write your answer in the space provided. The value of each part of each problem is shown in [brackets].

14. [10] Graph the function \( f(x) = \begin{cases} -x^2 & \text{if } x < 2 \\ 3 & \text{if } 2 \leq x \leq 5 \\ x - 3 & \text{if } x > 5 \end{cases} \)
15. [10] Use transformations to graph \( f(x) = -(x - 3)^2 + 6 \). Label your graphs!
16. The figure below shows a rectangle inscribed in an isosceles right triangle whose hypotenuse lies along the x-axis and is 8 units long.

![Diagram of a rectangle inscribed in an isosceles right triangle]

a. [8] Express the area $A$ of the rectangle in terms of $x$.  
   Ans: 

b. [2] What value of $x$ produces the largest area for the rectangle?  
   Ans: 

17. [10] Graph \( R(x) = \frac{x^2 + 2x - 15}{x + 2} \).

- [2] What are the x-intercepts, if any: Ans: _______________

- [2] What are the y-intercepts, if any: Ans: _______________

- [2] On the graph, show the vertical asymptotes, if any.
- [2] On the graph, show the horizontal or oblique asymptote, if any.
- [2] Does the graph cross any asymptotes? If so, where? Ans: _______________
18. Given \( f(x) = \frac{2}{x+1} \) and \( g(x) = (x-3)^2 \)

a. [4] Find the composition, \((f \circ g)(x)\) and simplify. Ans: 

b. [2] What is the domain of \((f \circ g)(x)\)? Ans: 

c. [4] Find \((f \circ g)(2)\). Ans: 