MATH 1110 UNIFORM FINAL EXAM

May 10,2003

Name: _____

Student Number: _____

Circle your section and instructor:

001	002	003	004	OL1
B. MacMillan Mon/Wed 1:00-2:15	C. Douthitt Mon/Wed 5:30-6:45	D. Gryboski Tue/Thur 8:30-9:45	J. Cowel Tue/Thur 11:30-12:45	R. Byrne On Line

Directions:

1. Complete the section above.
2. Put your name on ***Page 1*** of the test. You should have **7** pages of the test questions.
3. Although you are allowed a graphing calculator to take this test, **show all work** and be neat! If we can not follow your work, you will not receive any credit.
4. If you are confused about what a problem is asking, ask your instructor. You may <u>not</u> ask for hints or a verification on how you have completed a problem.

DO NOT WRITE IN THIS SPACE

Page 1. (18 pts)	Page 2. (25 pts)	Page 3. (22 pts)	Page 4. (33 pts)
Page 5. (19 pts)	Page 6. (19 pts)	Page 7. (14 pts)	

TOTAL: _____ (out of 150 points)

Name _____

1. (6 points) Solve the equation $\sqrt{2x-3} = 3-x$. Be careful to check for extraneous solutions.

2. (6 points) Solve the inequality $|1-2x| < \frac{3}{2}$. Write your answer in interval notation.

3. (6 points) Find an equation of a line that is perpendicular to the line y = -2x + 3 that goes through the point (-2 , 1). Write your answer in slope-intercept form.

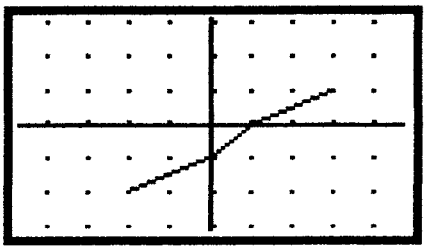
4. (6 points) The endpoints of the diameter of a circle are (7 , 2) and (1 , -6). Find the center and radius of the circle. Then write the equation of the circle.

enter: _____

Radius: _____

Equation: _____

5. (14 points) The entire graph of function f is shown.



Find the following:

a. f(-2) = _____

b. The intercepts of f, written as ordered pairs.

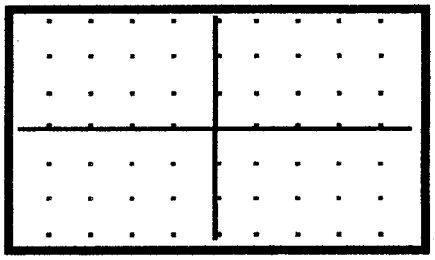
_____

c. The domain and range of f.

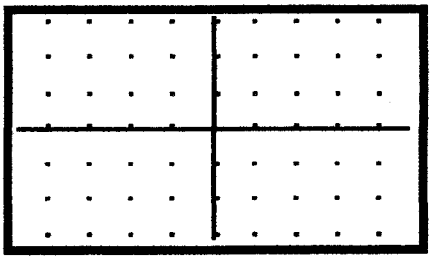
Domain: _____ Range : _____

d. Sketch the graph of the function;

i. $y = f(x+1)+2$



ii. $y = f^{-1}(x)$, the inverse of f(x).



6. (5 points) If $f(x) = 4x^2 - 4x - 3$, algebraically find the coordinates of the vertex.

7. (5 points) If $f(x)=3x-2$ and $g(x)=\frac{4x+1}{2x-3}$, find the following.

a. $f(g(1))=$ _____ b. $g(f(x))=$ _____

8. (6 points) The graph of $f(x)=-2\sqrt{x+3}$ can be obtained from the graph of $g(x)=\sqrt{x}$. State the transformations that you would apply to function g to obtain the graph of f.

(5 points) Write $\frac{5-i}{2+2i}$ in the form a + bi.

10. (6 points) Given that the roots of polynomial function f of degree 3 are x = -2, x = 3i, and x = -3i,

a. Write an expression, in factored form, of f. $f(x)=$ _____

b. Write f in standard form. $f(x)=$ _____

11. (12 points) Given $f(x)=\frac{x^2-4}{2x^2-x-1}$.

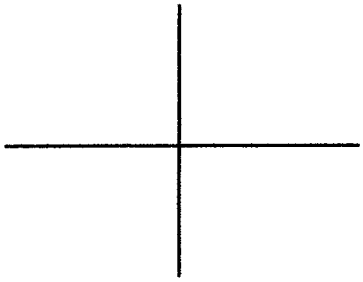
a. Write all intercepts (as ordered pairs). _____

b. Write equations of all asymptotes. _____

12. (15 points) Given the function $f(x)=2x^3-6x^2+5x-2$.

a. List all possible rational zeros of f. _____

b. Draw a complete graph of f.



c. Find all local maximum and minimum values of f.

Max: _____ Min: _____

d. Write the intervals where f is increasing and decreasing.

Increasing: _____

Decreasing: _____

e. The real zero of f is _____

f. Find the remaining complex zeros. _____

13. (6 points) If $f(x)=\frac{4}{2x+1}$, find $f^{-1}(x)$. $f^{-1}(x)=$ _____

14. (3 points) Write the exponential equation $t^n = y$, in its logarithmic form. _____

15. (5 points) Algebraically, solve the following equation. Be sure to show all work.

$$3^{2x-5} = 40$$

16. (5 points) Algebraically, solve the following equation. Be sure to show all work.

$$\log_2 x + \log_2 (x-3) = 2$$

17. (6 points) Nuclear energy derived from radioactive isotopes can be used to supply power to space vehicles. Suppose that the output of the radioactive power supply for a certain satellite is given by the function defined by:

$y = 40e^{-.004t}$, where y is measured in watts and t is the time in days.

a. What is the initial output of the power supply? _____

b. Algebraically, find after how many days the output will be reduced to 35 watts. Show your work. _____

18. (6 points) Radium 226 decays according to the exponential model $A(t) = A_0e^{kt}$, where t is time in years. There is initially 10 grams of Radium 226, and half of it decays in 1612 years (the half-life).

a. Find the value of k. k = _____

b. How much will be left after 1000 years? _____

19. (7 points) Values for Medicare costs (in billions of dollars) are shown in the table.

Year	Cost
2000	236
2001	249
2002	264
2003	281
2004	299
2005	318

a Draw a scatterplot of the data representing the cost of Medicare (in billions of dollars) from the year 2000. (Note: Let 2000 be t=0.)

b. Using a graphing calculator, find the linear function that best models the data.

_____

c. Use the function found in **part b** to predict the year the cost of Medicare reaches $400 billion dollars.

_____

20. (6 points) Solve the following system using matrices. State the method you used, show your set up, and find the final answer.

$$\begin{cases} x+y+z=6 \\ 2x-y+z=-9 \\ x-2y+3z=1 \end{cases}$$

21. (6 points) Swiss cheese and Limburger cheese cost different amounts per pound, but you don't know how much. A box containing 3 pounds of Swiss and 2 pounds of Limburger costs $24.40. Another box containing 4 pounds of Swiss and 5 pounds of Limburger costs $47.70. If these prices are for the cheese only (not for the box), how much is each kind of cheese worth per pound?

Note: You may use any method you prefer to solve this problem, but show your work.

22. (8 points) Evaluate each of the following matrix problems.

a. $\begin{bmatrix} y & 2 \\ 1 & 0 \end{bmatrix} - 2\begin{bmatrix} 0 & 4 \\ z & -7 \end{bmatrix}$

b. $\begin{bmatrix} a & -a \\ -b & b \end{bmatrix} \cdot \begin{bmatrix} 2 & 3 \\ -1 & 2 \end{bmatrix}$