

Math 112 Final

Your Name: _____

Instructor: _____

May 14, 2003

- There are 12 problems on the exam.
- No graphing or programmable calculators are allowed. Scientific calculators are allowed but are not needed.
- Give exact answers (fractions, square roots, etc.). Decimal approximations may not receive full credit.
- Please do not simplify unless explicitly told to. Answers such as $x = \frac{3^2\sqrt{25+6}}{12}$ are okay. Answers such as $3x + 4 = 7x - 2$ require more simplification.
- No notes or books are allowed.
- Use only the scratch paper provided
- Show your works and make your methods clear. Unjustified answer will receive no credit.
- Please CIRCLE your final answer

Problem	Points	Score
1	36	
2	14	
3	14	
4	14	
5	14	
6	14	
7	14	
8	14	
9	14	
10	14	
11	14	
12	24	
TOTAL	200	

Multiple Choice - Circle the correct answer. (4 pts each)

1.1. If the graph of $y = f(x)$ is the line segment with endpoints $(-3, 2)$ and $(4, 6)$ specify the endpoints of $y = f(x - 5) + 2$

a) $(-8, 4)$ and $(-1, 8)$ b) $(2, 4)$ and $(9, 8)$

c) $(-8, 2)$ and $(-1, 6)$ d) $(2, 0)$ and $(4, 4)$

1.2 The slope of the straight line through the points $(8, -2)$ and $(8, 8)$ is:

a) $\frac{6}{8}$ b) $\frac{8}{-2}$ c) 0 d) not defined

1.3. The solution to $3|4 - 5x| \leq 9$ is

a) $\frac{1}{5} \geq x \geq \frac{7}{5}$ b) $\frac{1}{5} \leq x \leq \frac{7}{5}$ c) $-\frac{1}{5} \leq x \leq \frac{4}{5}$ d) $\frac{1}{3} \leq x \leq \frac{1}{9}$

1.4. Find all solutions of the equation $|x^2 + 6x| = 3x + 18$

a) $-6, 3$ b) $-6, -3$

c) $6, 3$ d) $-3, 3, -6$

1.5. The domain of the function $f(x) = \frac{\sqrt{x-9}}{9+x}$ is

a) $(-\infty, 9)$ b) $(-\infty, \infty)$ c) $(9, \infty)$ d) $[9, \infty)$

1.6. Write the following complex number in $a + bi$ form: $\frac{1+2i}{4-3i}$

- a) $\frac{1}{4} - \frac{2}{3}i$ b) $-\frac{2}{25} + \frac{11}{25}i$ c) $\frac{9}{25} + \frac{1}{5}i$ d) $-\frac{5}{12}$

1.7. If we divide $x^3 + 3x^2 + x + 1$ by $x - 2$, the remainder would be:

- a) 1 b) 3 c) 23 d) 38

1.8. Solve the following for x : $e^{4x} + 2e^{2x} + 1 = 0$

- a) -1 b) 1 c) $\ln(3)$ d) the equation has no real solutions

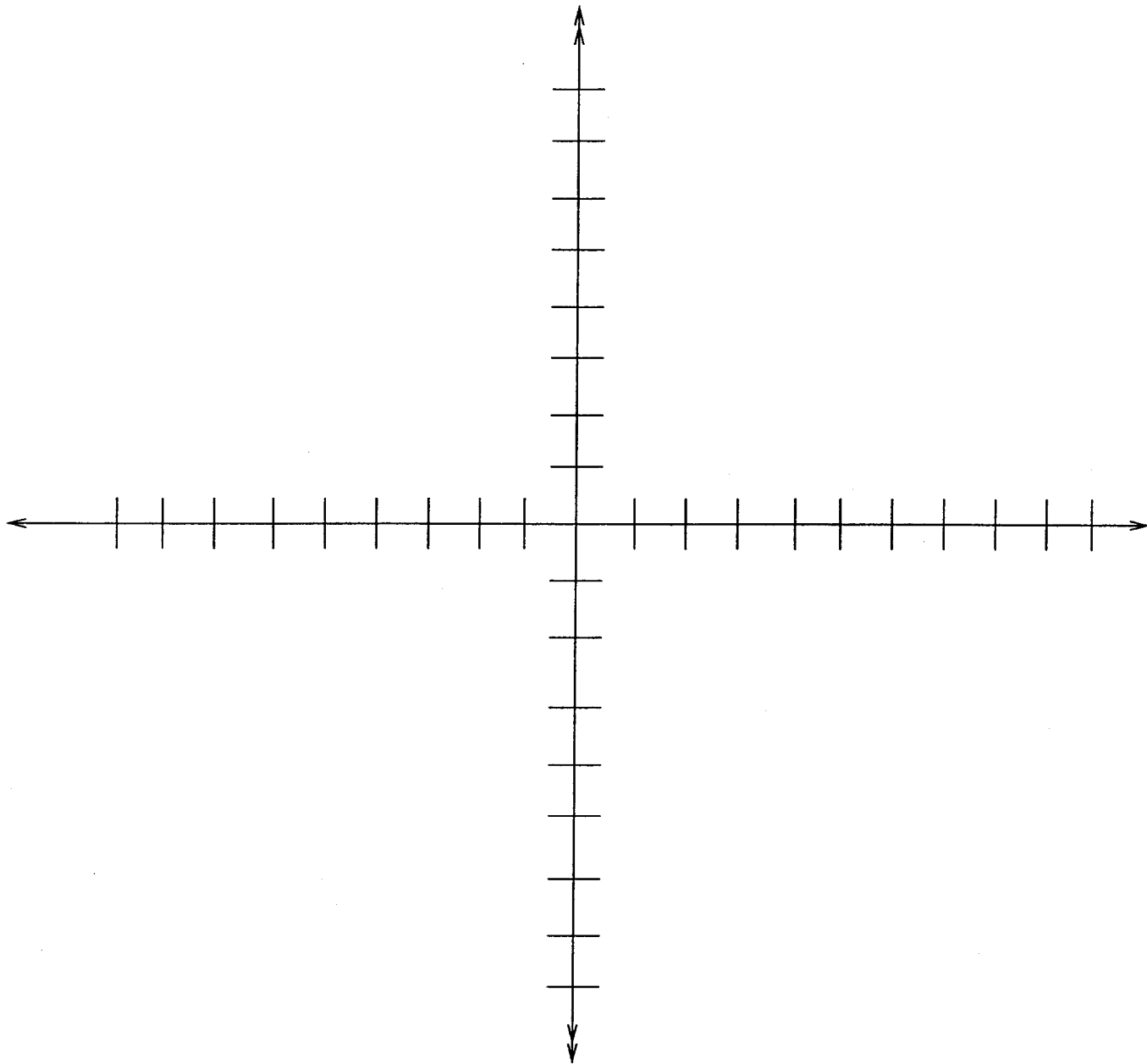
1.9. Let $f(x) = \ln(x + 7)$. The inverse function $f^{-1}(x)$ is:

- a) $e^x - 7$ b) e^{x-7} c) $\frac{1}{\ln(x+7)}$ d) the function has no inverse

2. a) Find the sum of the integers from -10 to 50.

b) The 60th term in an arithmetic sequence is 105 and the common difference is 5. Find the third term.

3. Sketch the following polynomial: $p(x) = \frac{1}{18}(x+1)^3(x-3)(x-5)^2$.



4. Find the area of the triangular region in the second quadrant that is bounded by the x-axis and the lines $x + y = 0$ and $y = 2x + 12$.

5. Clark invests \$10,000 in a bank account at 5% annual percentage rate with interest compounded continuously. Jim invests \$20,000 in an account at 4% annual percentage rate with interest compounded continuously. At what time (in years) will Clark's account and Jim's account have the same amount of money?

6. Solve the following equation: $x^3 - 7x - 6 = 0$ given that $x = -1$ is a solution.

7 a) Find the sum of the finite series: $\sum_{n=1}^8 5 \left(-\frac{3}{2}\right)^{n-1}$

b) Find the sum of the infinite series: $\sum_{n=0}^{\infty} \left(\frac{1}{10}\right)^n$

8. Let $f(x) = \ln(x) + \ln(x - 4)$.

a) Find the domain of f .

b) Solve $\ln(x) + \ln(x - 4) \geq \ln(32)$

9. Give an example of a polynomial with the following properties or state why one doesn't exist:

a) double root at $x = 3$ and a single root at $x = 1$.

b) root at $x_1 = a + \sqrt{5}$ and $x_2 = a - \sqrt{5}$, degree 2. Write your answer in $Ax^2 + Bx + C$ form.

10. The rectangular floor of a one-story building is 12 feet longer than it is wide. The building has 1564 square feet of floor space. Find the length and width of the floor.

11. Solve the system of equations.

$$\begin{array}{r} x - y + 2z = 4 \\ -3x + 2y - 6z = -3 \\ x - 3y + z = 2 \end{array}$$

Simplify as much as possible (6 pts each)

12.1.

$$\sqrt[3]{16x^5}$$

12.2.

$$\frac{x^{-3}x^{\frac{1}{2}}}{x^{\frac{3}{2}}x^{-1}}$$

12.3

$$\frac{\frac{1}{t} - 1}{1 - \frac{t}{t-1}}$$

12.4

$$\sqrt{x^2y^2 + 4x^2y^4}$$