

# Math 112 Carter Final Exam Fall 2001

**General Instructions:** Write your name on only the outside of your blue book. Do all your work inside your blue book. Indicate your answers clearly. Please put the test inside your blue book as you leave. Do not write on this sheet. Point values for each of the following problems are as indicated.

1. (10 points each) Sketch the graph of each of the following functions. Be sure to indicate a sense of scale.

(a)

$$y = 10|x - 25| + 5$$

(b)

$$y = 4x^2 - 8x + 2$$

(c)

$$y = \frac{x}{x - 25}$$

(d)

$$y = \log(x + 1)$$

(e)

$$y = e^x + 1$$

2. (10 points) The equation

$$x^2 - 8x + y^2 - 6y = 119$$

represents a circle. Find its center and its radius.

3. (10 points each) Solve the following inequalities.

(a)

$$45 \leq |3x - 18|$$

(b)

$$\frac{(x - 1)(x + 1)}{(x - 2)} \leq 0$$

(c)

$$3^x \leq 729$$

4. (10 points) Solve the following system of equations

$$a + b + c + d = 1$$

$$2a - b - c - d = 1$$

$$a + 2b + c - 3d = 0$$

$$a - 3b + 2c + d = 4$$

5. (15 points) For the function

$$f(x) = x^4 - 2x^3 - 18x^2 + 6x + 45$$

list all possible rational roots, determine all real roots and sketch the graph.

6. (5 points each) For each of the follow sets of roots give a polynomial of degree 3 that has rational coefficients and has the given numbers as roots. Multiply your answer out and put it in the form:

$$f(x) = Ax^3 + Bx^2 + Cx + D$$

- (a)  $(1 - \sqrt{3})/2, 1$ ;
- (b)  $1 + 2i, 3$ ;
- (c)  $1, 0, -1$ .
7. (10 points) A certain type of insect harmful to polyester has a doubling time of 2.5 months. An initial population of 300 was observed in a polyester plant north of Mobile on Dec. 1. How long will it be until this population will grow to 34,123?
8. (10 points) Find the amount of time that it would take for an investment of \$453,476 to become \$2,500,000 if it is left in an account that bears 12.125% interest that is compounded continuously?