MAT 103 NAME:
Franklin College, Spring 2003
Dr. Prisner

SAMPLE Midterm Exam

Part I: This part contains 9 questions, worth 19 points.

1)(2 points) Write as one rational expression, and simplify:

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

2)(3 points) Simplify and express answers using positive exponents only:
a) $b^2 b^{-3} = ...$
b) $(u^2)^3 = ...$

3)(1 point) True or false: Every real number has a cubic root.

4)(2 points) Solve $2x + 4 = x + 8$.

5)(2 points) Solve $(x-3)(x+2)(2x-3) = 0$ (Hint: Don't multiply, use the "Zero Property".)

6)(2 points) Solve the following system of equalities:

$$\begin{aligned} 4x + 5y &= 3 \\ 3x - 5y &= 1 \end{aligned}$$

7)(2 points) Solve $|x+3| \leq 5$ and graph the solutions on the real number line.

8)(2 points) Write the difference of these complex numbers in standard form:

$$(2+i) - (3-2i) = ...$$

9)(3 points) Solve the following quadratic equation (for instance by using the quadratic formula): Don't forget to bring it into standard form first.

$$3x^2 - 4x = 2$$

Part II: This part contains six problems, but you have to solve only **four** of them. Since each problem is worth 4 points, you may get a total of 16 points in this part.

For the word problems (13, 14, 15), use the standard procedure:

- Label your variables clearly,
- Formulate the equation(s),
- Solve the equation(s),
- Check your solution(s).

For each of these four steps you will get a point. If you cannot do some step, (like solving the equation) just make an assumption (guess) and proceed (in this case: check)

10)(4 points) Use the substitution $u = \frac{1}{x+1}$ to solve the equation

$$\frac{3}{(x+1)^2} - \frac{4}{x+1} - 4 = 0$$

11)(4 points) Solve. Don't forget to check!

$$x + 1 - \sqrt{5 + x - 2x^2} = 0$$

12)(4 points) Solve $(x-3)(x+2)(2x-3) < 0$, and graph the solutions on the real number line.

13)(4 points) The Perimeter of a rectangle is 112 m. Its area is 759m^2. What are the dimensions of the rectangle?

14)(4 points) A chemist has two solutions of hydrochloric acid in stock: a 50 % solution and an 90 % solution. How much of each should be used to obtain 50 milliliters of an 74 % solution.

15)(4 points) Ernie asks Bert: "Could you help me painting the room? Together we would finish 1 hour 15 minutes earlier than me alone." If we know that Bert alone would need 1 hour and 48 minutes, how long would Ernie need alone?