MAT 103 NAME:
Franklin College, Spring 2006
Dr. Prisner

Midterm Exam

This midterm is, as all our tests and quizzes, a closed-book-and-notes exam. Please note that calculators, even graphic calculators, are allowed, but notebooks, organizers, palm computers, cell phone, ... everything where you can store text, is **not allowed.**

Please show all your work. GOOD LUCK!

Part I: This part contains 9 questions, worth 21 points.

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

$$5 - \frac{x-3}{x+5}$$

2)(2 points) Simplify and express answers using positive exponents only:

$$\left(\frac{4a^{-1}b^5}{9a^2b^{-3}}\right)^{1/2}$$

3)(2 points) Simplify $(2x^2 - x + 1)(x - 1) - (2x + 3)$

4)(3 points) Solve

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

5)(2 points) Solve the following system of equations:

$$\begin{aligned} 2x + 4y &= 5 \\ 3x - 2y &= 1 \end{aligned}$$

6)(2 points) Solve $|x + 3| = 4$.

7)(2 points) Solve the inequality $3(x - 2) < x + (2 - 3x)$ and graph the solution set on the real number line.

8)(3 points) Solve the following quadratic equation (for instance by using the quadratic formula): Don't forget to bring it into standard form first.

$$5x - 3x^2 = 1$$

9)(3 points) a) How is the square root of a number a defined?

b) When are two equations called "equivalent"?

c) What is a complex number? What is the relation between complex and real numbers?

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, 16), use the standard procedure:

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

If you cannot do some step, (like solving the equation) just make an assumption (guess) and proceed (in this case: check)

10)(4 points) Solve. Don't forget to check!

$$\frac{2}{x-2} - \frac{3}{x-3} = \frac{x-1}{(x-2)(x-3)}$$

11)(4 points) Solve the equation

$$\sqrt{2x^2-8} - 4x + 16 = 0.$$

Don't forget to check your soltuion(s)!

12)(4 points) A boat takes one and a half hours longer to go 30 miles up a river than to return. If the rate of the current is 5 miles per hour, what is the rate of the boat in still water?

13)(4 points) A car travels 150 km at a certain speed. If the speed had been 20 km/h faster, the trip could have been made in 15 minutes less time. Find the speed.

14)(4 points) Peanuts cost per 3.50 SFR per pound, wheras walnuts cost 7.00 SFR per pound. Your task is to mix a nut mix that costs 5.00 SFR per pound. How much peanuts and how much walnuts do you mix?

15)(4 points) Beth can paint a room in 6 hours. If she and Adam would work together, they would need 3 hours and 20 minutes only. How much time would Adam need if he would paint the room alone?