Midterm 2, Math 30, Fall 2008, 11/10/08

Instructions: Write your name and section number. Draw grading table on the cover. Read each problem carefully and follow all of its instructions. For each of the problems below, write a clear and concise solution in your blue book. Solutions must be simplified as much as possible, no full credit for partially completed problems. **Blue books with torn or missing pages will not be accepted !**

1. Use the Midpoint rule to find the approximation to $\int_1^5 \frac{dx}{x+1}$ with n = 4. You can leave your answer in terms of the numerical sum. (Exact solution will not get you full credit!). **(10 pts)**

2. Trout population in the lake is modeled by the equation.
   $\frac{dP}{dt} = P^2(P-2000)(3000-P)$
   a) Find and identify by type equilibrium points. **(4 pts)**
   b) Plot the fish population over time if the starting population is 2500 **(3 pts)**
   c) Plot the fish population over time if the starting population is 3500 **(3 pts)**
   (Note: In your drawing clearly label points on the axis and explain what happens to population after a long time)

3. A probability density function is given by $f(x) = \frac{A}{(x+1)^3}$ for $x \geq 0$ and $f(x) = 0$ for x < 0.
   a. Solve for A. **(5 pts)**
   b. Find the median **(5 pts)**

4. A medical laser is cutting a tissue along the arc $y = \frac{2}{3}x^{3/2}$ from x = 0 to x = 3 cm. If the laser spot is moving at 0.1 cm/sec, calculate the time it takes to complete the cut. **(10 pts)**

5. For what values of r does the function $y = e^{rx}$ satisfy the equation $2y'' + y' - y = 0$ **(10 pts)**

Extra Credit (5 pts)

In problem 3 find the average.