Engineering Analysis I, MAT 3253. Exam, Oct. 13, 1993. Instructor: D. Gokhman Show all pertinent work, answers alone are not sufficient. Box the answers.

Name: _

1. (32) Find <u>all</u> continuous solutions to each of the initial value problems:

(a)
$$\frac{dy}{dx} = 2y^{\frac{2}{3}}, \quad y(1) = 0;$$
 (b) $y' - y = \begin{cases} 0 & \text{for } x \le 1\\ 5 & \text{for } x > 1 \end{cases}, \quad y(0) = 3.$

- 2. (18) Test the differential $(2e^x e^y) dx xe^y dy$ for exactness and find all functions F(x, y), whose gradient dF is the given differential.
- 3. (20) Find a 1st order differential equation satisfied by the family of all circles in the plane centered at the point (1, 1). Find the family of all curves orthogonal to all these circles. Sketch a few curves from both families.
- 4. (30) Find all solutions to each of the following equations:

(a)
$$y' = y^2 + 3y + 2$$
; (b) $y' = x |y|$.

(Hint: In part (b) take cases.)

1	2	3	4	total (100)