Math 202- Quiz 1

March 21, 2009

- The duration of the test is 1 hour
- No calculators are allowed
- Fit all your answers on the question sheet

NAME:———————————————— **SECTION:**————————

1. (15 points) Solve the given initial value problem

$$y' = \frac{1+3x^2}{3y^2-6y} \qquad y(1) = 0$$

and determine the interval in which the solution is valid.

2. (15 points) Express the solution y(x) of the initial-value problem $x^3y'+2x^2y = 10\sin x, y(1) = 0$ in terms of Si(x) where

$$Si(x) = \int_0^x \frac{sint}{t}dt,$$

where the integrand is defined to be 1 at $t = 0$.

3. (10 points) Solve the given differential equation

$$y' = \frac{4y - 3x}{2x - y}$$

4. (15 points) Solve the differential equation by finding the appropriate integrating factor.

$$6xydx + (4y + 9x^2)dy = 0.$$

5. (15 points) Solve the following differential equation

$$t^2\frac{dy}{dt} + 2ty - y^3 = 0, \quad t > 0.$$

6. (10 points) Calculate the surface integral $\int\int_S y dS$, where S is the portion of the graph of $z = x + y^2$ where $0 \leq x \leq y \leq 1$.

7. (10 points) Use Stoke's theorem to compute $I = \int_C F.ds$, where

$$F = \sin x^2 i + (e^{y^2} + x^2)j + (z^4 + 2x^2)k$$

and C is the boundary of the triangle in the first octant cut by the plane $\frac{x}{3} + \frac{y}{2} + z = 1$ traversed counterclockwise.

8. (10 points) Compute the outward flux of $F = xyi + (y^2 + e^{xz^2})j + sin(xy)k$ over the surface of the region bounded by the parabolic cylinder $z = 1 - x^2$ and the planes $z = 0, y = 0$ and $y + z = 2$.