

American University of Beirut

MATH 202

*Differential Equations*

*Spring 2010*

quiz # 1

put your section's number on your booklet please: 13 (T 11) 14 (T 12:30) 15 (T 2) 16 (T 9:30)

**Exercise 1** Find at least two solutions of the IVP:

$$y' = y^{2/3}, \quad y(0) = 0$$

does it contradict the existence and uniqueness theorem? justify.

**Exercise 2** Solve the DE:

$$\frac{dy}{dx} = x(y^2 - 1)$$

is there any singular solution ? justify.

**Exercise 3** Solve the IVP:

$$xy' + y = e^x, \quad y(-1) = 4$$

give the largest interval  $I$  of over which the solution is defined.

**Exercise 4 a.** Give an appropriate parametrization for the surface ( $S$ ) of the paraboloid

$$z = 1 - x^2 - y^2, \quad z \geq 0.$$

**b.** Evaluate the surface integral

$$\int \int_S x^2 \sqrt{5 - 4z} \, d\sigma$$

**Exercise 5** Use Stokes theorem to find the circulation of  $\mathbf{F} = y^2\mathbf{i} - y\mathbf{j} + 3z^2\mathbf{k}$  around the ellipse  $C$  in which the plane  $2x + 6y - 3z = 6$  meets the cylinder  $x^2 + y^2 = 1$ , counterclockwise as viewed from above.