## QUIZ 1 - MATH 310 YOUR NAME:\_\_\_\_

Read each problem **very carefully** before starting to solve it. Each problem is worth 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Suppose a mouse population p satisfies the differential equation

$$\frac{dp}{dt} = \frac{1}{4}p - 500, \quad p(0) = 1500.$$

(a) Find the size of the population p(t) at time t.

(b) Find the time t when the mice will become extinct.

2. Tell the order and whether the following differential equations are linear or nonlinear:

(a) 
$$(y+3)\frac{d^2y}{dt^2} + t\frac{dy}{dt} = e^t + t;$$

(b) 
$$\frac{d^3y}{dt^3} + t\frac{dy}{dt} + \cos^2(t)y = t^3$$

3. Is  $y(t) = \frac{t}{3} + e^{-t}$  a solution of  $y^{(4)} + 4y''' + 3y = t$ ? Please, show all your work neatly!