

QUIZ 1 - MATH 310

Thursday, January 25

YOUR NAME: _____

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

1. [6 points] Solve the initial value problem

$$(50 + t) \frac{dy}{dt} = 24(50 + t) - 3y, \quad y(0) = 300.$$

2. [6 points] Solve the initial value problem

$$\frac{dy}{dx} = \frac{x(e^{x^2} + 4)}{4y^2}, \quad y(0) = 1.$$

3. [6 points] Suppose the population p of certain species tends to increase at a rate proportional to the current population, with constant of proportionality 3. However, due to a predator species, sharing the same environment, it also tends to decrease by a constant rate of 5.

(a) Find a differential equation for the population p .

(b) Solve to find the population at time t , given that the current population is roughly $\frac{100}{3}$ individuals.