

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. [3 points] In a certain refuge, prey and predators coexist. The population P of prey is increasing at a rate proportional to the current population (with constant of proportionality k), whereas prey are also killed off at the constant rate of 5 per month.

Describe carefully the variables chosen and their units, and write a differential equation describing this system. (You do not have to solve it.)

2. [7 points] Solve the initial value system (assume $y \geq 0$)

$$\frac{dy}{dt} = 3y + 1, \quad y(0) = \frac{5}{3}.$$