

Quiz 3, Math 246, Professor David Levermore
Tuesday, 13 February 2018

Your Name:

Discussion Instructor (circle one):	Kilian Cooley	Corry Bedwell	Thien Ngo
Discussion Time (circle one):	8:00	9:00	10:00
			11:00

No books, notes, calculators, or any electronic devices.

Show your reasoning for full credit. Good luck!

- (1) [4] In the absence of predators the population of mosquitoes in a certain area would increase at a rate proportional to its current population such that it would double every seven weeks. There are 240,000 mosquitoes in the area when a flock of birds arrives that eats 30,000 mosquitoes per week. Write down an initial-value problem that governs the population of mosquitoes in the area after the flock of birds arrives. (Do not solve the initial-value problem!)

- (2) [2] Suppose we have used the Runge-trapezoidal method to approximate the solution of an initial-value problem over the time interval $[5, 15]$ with 1000 uniform time steps. About how many uniform time steps do we need to reduce the global error of our approximation by a factor of $\frac{1}{81}$?

- (3) [4] Consider the initial-value problem

$$\frac{dv}{dt} = 3v - v^2, \quad v(0) = 2.$$

Use one step of the Runge-trapezoidal method to approximate $v(.2)$. Your answer can be left as an arithmetic expression.