

Quiz # 5

Name: \_\_\_\_\_

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Math 128A - 106: Fall 2024

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*For full credit, please clearly show all your work.*

## **Problem 1**

Consider the ODE  $y(t)' = -4y(t)$ , with initial condition  $y(0) = 3$ .

1. What is the analytical solution to this ODE?
2. Recall Euler's method  $y(t + h) = y(t) + hy'(t)$ . Apply one step of Euler's method to approximate the solution of  $y(t)$  at  $t = 0.25$ .

## Problem 2

Consider the Butcher table:

0	0	0
$\frac{2}{3}$	$\frac{2}{3}$	0
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	$\frac{1}{4}$	$\frac{3}{4}$

1. Write out the corresponding RK method. Is the method explicit or implicit? Why?
2. Apply one step of this RK method to approximate  $y(t)$  at  $t = 0.25$ , where  $y'(t) = -4y(t)$ ,  $y(0) =$
3. (Same ODE from the first question)