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## Math 2150 - Homework # 13

### Eulers method

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1. (a) Consider the initial-value problem

$$y' = 2x - 3y + 1, \quad y(1) = 5$$

Approximate the solution to this problem on the interval  $1 \leq x \leq 1.25$  using a step interval of  $h = 0.05$ . What do you approximate the solution's value to be at  $x = 1.25$  ?

- (b) Use the methods you've learned to find the actual solution to the initial-value problem and compare it to your approximation at the point  $x = 1.25$ . How close was the approximation?
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2. Consider the initial-value problem

$$y' = 1 + y^2, \quad y(0) = 0$$

Approximate the solution to this problem on the interval  $0 \leq x \leq 0.5$  using a step interval of  $h = 0.1$ . What do you approximate the solution's value to be at  $x = 0.5$

*[Note: The above ODE is a non-linear equation. We never learned how to solve it explicitly. So for now all we know how to do is approximate the solution.]*

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3. Consider the initial-value problem

$$y' = xy + \sqrt{y}, \quad y(0) = 1$$

Approximate the solution to this problem on the interval  $0 \leq x \leq 0.5$  using a step interval of  $h = 0.1$ . What do you approximate the solution's value to be at  $x = 0.5$

*[Note: The above ODE is a non-linear equation. We never learned how to solve it explicitly. So for now all we know how to do is approximate the solution.]*

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