

Math 3280 Worksheet 35: first-order systems

Group members (1 to 4): _____

(1) Solve the initial value problem

$$x_1' = x_1 + 2x_2$$

$$x_2' = -2x_1 + x_2$$

$$x_1(0) = 1$$

$$x_2(0) = 2.$$

- (2) Approximate the value of $x_1(0.5)$ and $x_2(0.5)$ for the system $x_1' = x_1 + 2x_2$, $x_2' = -2x_1 + x_2$ if $x_1(0) = 1$ and $x_2(0) = 2$ using Euler's method with 2 steps.

- (3) Compare your answer above to the exact solution from (1), and indicate on the vector field plot both the approximate path (a series of line segments using the Euler's method points) and the corresponding points of the exact solution (i.e. $x(0)$, $x(0.25)$, $x(0.5)$).

