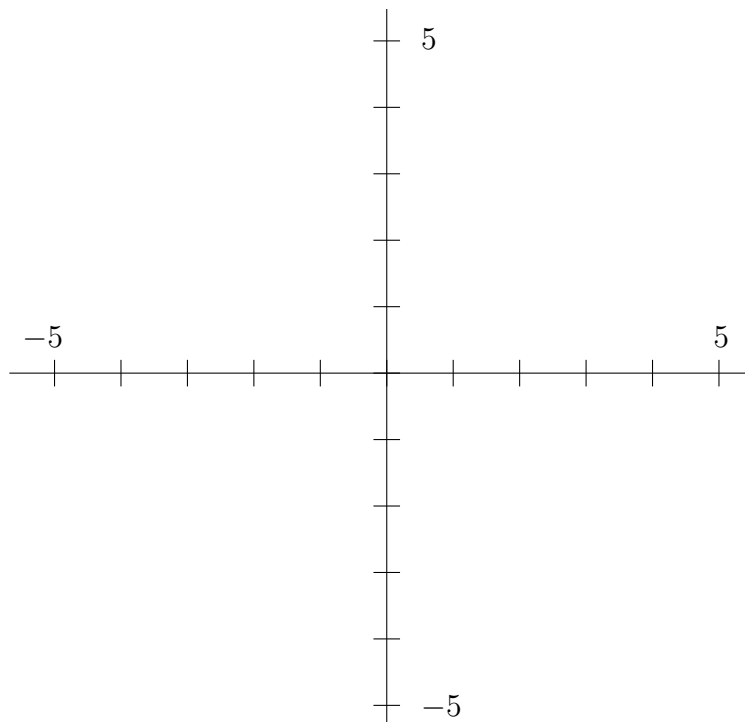


Sample Quiz 2 for M309

(1a) Let  $A = \begin{bmatrix} 3 & 2 \\ -2 & -2 \end{bmatrix}$  Find the solution to  $x' = Ax$  with  $x(0) = \begin{bmatrix} -1 \\ 5 \end{bmatrix}$ .

(1b) Sketch the trajectory of (1a), indicating the direction.

(2c) Sketch (with direction) a trajectory of  $x' = Ax$  which lies entirely in quadrant II.



(2) We want an approximate solution to  $\begin{cases} x' = x(1.5 - 0.5y) \\ y' = y(-0.5 + x) \end{cases}$  with  $\begin{bmatrix} x(0) \\ y(0) \end{bmatrix} = \begin{bmatrix} 0.25 \\ 1 \end{bmatrix}$ .

(2a) Take  $\Delta t = 0.2$  and find approx. values for  $(x(0.2), y(0.2))$ . Plot this point.

(2b) Do two steps, each with  $\Delta t = 0.1$ , and find approx. values for  $(x(0.2), y(0.2))$ . Plot these points.