

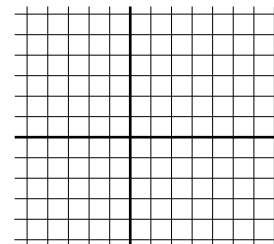
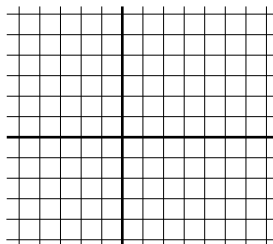
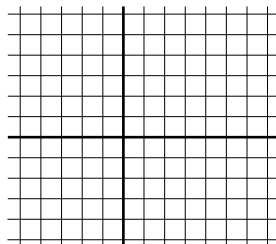
Give that the solution to  $\mathbf{x}' = \begin{bmatrix} a & b \\ c & d \end{bmatrix} \mathbf{x}$  is  $\mathbf{x} = c_1 \begin{bmatrix} v_1 \\ v_2 \end{bmatrix} e^{r_1 t} + c_2 \begin{bmatrix} w_1 \\ w_2 \end{bmatrix} e^{r_2 t}$

[7] 2a.) Graph the solution to the IVP  $\begin{bmatrix} x_1(0) \\ x_2(0) \end{bmatrix} = \begin{bmatrix} w_1 \\ w_2 \end{bmatrix}$  in the

$t, x_1$ -plane

$t, x_2$ -plane

$x_1, x_2$ -plane

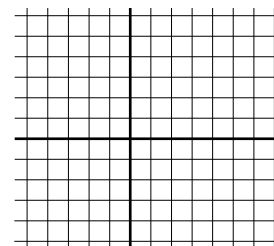
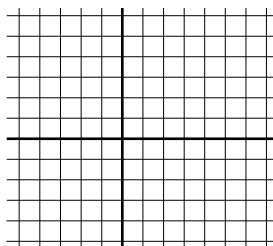
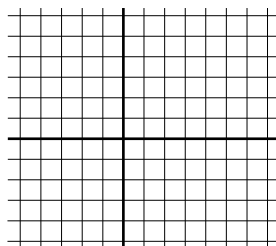


[3] 2b.) Graph the solution to the IVP  $\begin{bmatrix} x_1(0) \\ x_2(0) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$  in the

$t, x_1$ -plane

$t, x_2$ -plane

$x_1, x_2$ -plane



[2] 2c.) The equilibrium solution for this system of equations is  $\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} \phantom{0} \\ \phantom{0} \end{bmatrix}$ .

[3] 2d.)  $\frac{dx_2}{dx_1} = \underline{\hspace{2cm}}$

[2] 2e.) Plot several direction vectors where the slope is 0 and where slope is vertical.

[10] 2f.) Graph several trajectories.

