MATH 246 Groupwork 3.6 **Name:** ______________________________

For each of the following the eigenvalues and eigenvectors are given. For each, sketch a reasonable family of solutions and then trace the specific solution with initial value $\bar{x}(0) = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$.

1. $\bar{x}' = \begin{bmatrix} 0 & 1 \\ -6 & 5 \end{bmatrix} \bar{x}$ has $\left\{2, \begin{bmatrix} 1 \\ 2 \end{bmatrix}\right\}$ and $\left\{3, \begin{bmatrix} 1 \\ 3 \end{bmatrix}\right\}$.

2. $\bar{x}' = \begin{bmatrix} -3 & -2.5 \\ 0 & 2 \end{bmatrix} \bar{x}$ has $\left\{-3, \begin{bmatrix} 1 \\ 0 \end{bmatrix}\right\}$ and $\left\{2, \begin{bmatrix} -1 \\ 2 \end{bmatrix}\right\}$.

3. $\bar{x}' = \begin{bmatrix} 2 & -8 \\ -1 & 4 \end{bmatrix} \bar{x}$ has $\left\{0, \begin{bmatrix} 4 \\ 1 \end{bmatrix}\right\}$ and $\left\{6, \begin{bmatrix} 2 \\ -1 \end{bmatrix}\right\}$.

4. $\bar{x}' = \begin{bmatrix} -3 & 0 \\ 0 & -3 \end{bmatrix} \bar{x}$ has $\left\{-3, \begin{bmatrix} 1 \\ 0 \end{bmatrix}\right\}$ and $\left\{-3, \begin{bmatrix} 0 \\ 1 \end{bmatrix}\right\}$.

5. $\bar{x}' = \begin{bmatrix} 3 & -4 \\ 2 & 1 \end{bmatrix} \bar{x}$ has $\left\{1 + 2i, \begin{bmatrix} 1 + i \\ 1 \end{bmatrix}\right\}$ and $\left\{1 - 2i, \begin{bmatrix} 1 - i \\ 1 \end{bmatrix}\right\}$.

6. $\bar{x}' = \begin{bmatrix} 4 & 2 \\ 0 & 4 \end{bmatrix} \bar{x}$ has $\left\{4, \begin{bmatrix} 1 \\ 0 \end{bmatrix}\right\}$.