Differential Equations and Matrix Algebra II
Worksheet #3
Professor Broughton

Name:_____________ Section #: __________ Box #:_________

For all the systems on this worksheet, find the critical points, find the local linearization, find the eigenvalues and eigenvectors (if real) at the critical point and sketch the phase portrait, showing the character of each critical point.

1.

\[ x' = -x + y \]
\[ y' = -2y \]
2.

\[ x' = -0.5x + y \]
\[ y' = -x - 0.5y \]
3.

\[ x' = y + 1 \]
\[ y' = x + 1 \]
4.

\[ x' = x + y \]
\[ y' = 2y \]
5.

\[ x' = x + y \]
\[ y' = y \]
6.

\[ x' = 2x - xy \]
\[ y' = -y + xy \]
7.

\[ x' = -x(1 - y)(3 - y); \]
\[ y' = y(2 - x)(4 - x) \]