## MATH 246 Homework 3.2

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## Directions:

- Work should be done neatly and on separate paper.
- Enough work must be shown so that the steps you are taking is clear.

1. Find the eigenvalues and eigenvectors for each of the following matrices:
(a) $A=\left[\begin{array}{ll}1 & 2 \\ 3 & 2\end{array}\right]$
(b) $A=\left[\begin{array}{rr}3 & -2 \\ -1 & 4\end{array}\right]$
(c) $A=\left[\begin{array}{rr}3 & -2 \\ 1 & 4\end{array}\right]$
(d) $A=\left[\begin{array}{ll}0 & 1 \\ 2 & 2\end{array}\right]$
(e) $A=\left[\begin{array}{ll}3 & 0 \\ 4 & 3\end{array}\right]$
(f) $A=\left[\begin{array}{rr}5 & 4 \\ -25 & -15\end{array}\right]$
(g) $A=\left[\begin{array}{rr}4 & 0 \\ -1 & 4\end{array}\right]$
2. Consider the system:

$$
\bar{x}^{\prime}=\left[\begin{array}{ll}
1 & 1 \\
4 & 1
\end{array}\right] \bar{x}
$$

(a) Show that the following form a fundamental pair:

$$
\left\{\bar{x}_{1}, \bar{x}_{2}\right\}=\left\{\left[\begin{array}{r}
e^{3 t} \\
2 e^{3 t}
\end{array}\right],\left[\begin{array}{r}
e^{-t} \\
-2 e^{-t}
\end{array}\right]\right\}
$$

(b) Write down what the general solution looks like.
(c) Solve the IVP with:

$$
\bar{x}(0)=\left[\begin{array}{l}
1 \\
2
\end{array}\right]
$$

