MATH 331.02 Ordinary Differential Equation Professor Franz Pedit
Answer Key for **HW 10**

3. [15 pts]

(i) [5 pts] (1 pt for attempt; 2 pts for each eigensolution)

Eigenvalues & Eigenvectors: $\begin{cases} \lambda_1 = -2, & \vec{v}_{\lambda=-2} = \begin{pmatrix}1\\0\end{pmatrix} \\ \lambda_1 = 1, & \vec{v}_{\lambda=1} = \begin{pmatrix}1\\1\end{pmatrix} \end{cases}$ $\left(\begin{pmatrix}3\\0\end{pmatrix}, \begin{pmatrix}3\\3\end{pmatrix} \text{ are acceptable}\right)$

Eigensolutions: $\begin{cases} \vec{y}_1(t) = e^{-2t} + e^{t} \\ \vec{y}_2(t) = e^{t} \end{cases}$ or $\begin{cases} \vec{y}_1(t) = e^{-2t}\begin{pmatrix}1\\0\end{pmatrix} \\ \vec{y}_2(t) = e^{t}\begin{pmatrix}1\\1\end{pmatrix} \end{cases}$

(ii) [3 pts] (1 pt for attempt)

(graph)

(iii) [7 pts] (1 pt for attempt)

$\vec{y}(t) = -e^{-2t}\begin{pmatrix}1\\0\end{pmatrix} + 2e^{t}\begin{pmatrix}1\\1\end{pmatrix}$ when $\vec{y}(0) = \begin{pmatrix}1\\2\end{pmatrix}$ [**3 pts**]

(graph) **[3 pts]**

In[1]:=
```
mat := {{-2, 3}, {0, 1}}
Eigenvalues[mat]
```
고유치
```
Eigenvectors[mat]
```
고유 벡터

Out[2]= $\{-2, 1\}$

Out[3]= $\{\{1, 0\}, \{1, 1\}\}$

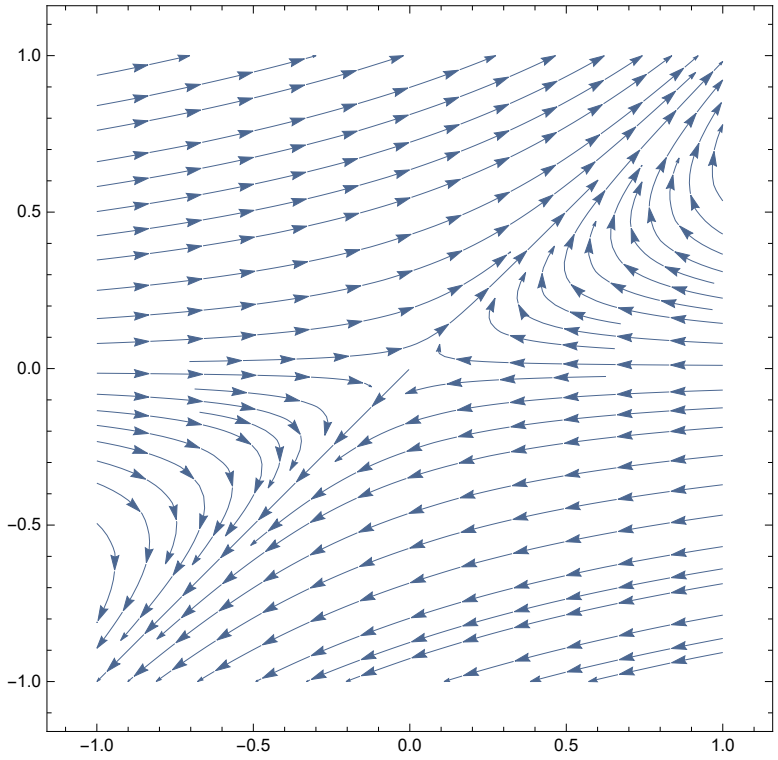
In[4]:=
```
y = a * Exp[-2 * t] * {1, 0} + b * Exp[t] * {1, 1}
```
지수 함수 지수 함수
```
yy := y /. t → 0
Solve[{1, 2} == yy]
```
풀이 함수

Out[4]= $\left\{a\, e^{-2\,t} + b\, e^{t},\ b\, e^{t}\right\}$

Out[6]= $\{\{a \to -1,\ b \to 2\}\}$

In[7]:=
```
StreamPlot[{-2 * y1 + 3 * y2, 0 * y1 + 1 * y2}, {y1, -1, 1}, {y2, -1, 1}]
```
스트림 플롯

Out[7]=



In[8]:=
```
ParametricPlot[{-Exp[-2 t] + 2 Exp[t], 2 * Exp[t]}, {t, -1, 1}]
```
파라 메트릭 플롯 지수 함수 지수 함수 지수 함수

Out[8]=