Answer to GREEN Exam

1. **C**

2. **B**

3. **D**

4. **A**

5. **D**

6. **C**

7. **E**

8. (1) $T\left(\begin{bmatrix}1 & 2\\ 3 & 4\end{bmatrix}\right) = \begin{bmatrix}2 & 5\\ 5 & 8\end{bmatrix}$

   (2) A basis is $\left\{\begin{bmatrix}1 & 0\\ 0 & 0\end{bmatrix}, \begin{bmatrix}0 & 1\\ 1 & 0\end{bmatrix}, \begin{bmatrix}0 & 0\\ 0 & 1\end{bmatrix}\right\}$ Answer may vary!

   (3) A basis is $\left\{\begin{bmatrix}0 & 1\\ -1 & 0\end{bmatrix}\right\}$ Answer may vary!

9. (1) $\lambda_1 = 1$, a basis is $\left\{\begin{bmatrix}0\\ 1\\ -1\end{bmatrix}\right\}$ $\lambda_2 = \lambda_3 = 4$, a basis is $\left\{\begin{bmatrix}2\\ 1\\ 0\end{bmatrix}, \begin{bmatrix}-1\\ 0\\ 1\end{bmatrix}\right\}$

   Answer may vary!

   (2) $P = \begin{bmatrix}0 & 2 & -1\\ 1 & 1 & 0\\ -1 & 0 & 1\end{bmatrix}, D = \begin{bmatrix}1 & 0 & 0\\ 0 & 4 & 0\\ 0 & 0 & 4\end{bmatrix}$ Answer may vary!

10. (1) $\lambda_1 = -1, \boldsymbol{v}_1 = \begin{bmatrix}1\\ 4\end{bmatrix}$ $\lambda_2 = -6, \boldsymbol{v}_2 = \begin{bmatrix}1\\ -1\end{bmatrix}$ Answer may vary!

    (2) $\begin{bmatrix}x(t)\\ y(t)\end{bmatrix} = c_1\begin{bmatrix}e^{-t}\\ 4e^{-t}\end{bmatrix} + c_2\begin{bmatrix}e^{-6t}\\ -e^{-6t}\end{bmatrix}$ for arbitrary constants c_1 and c_2

    Answer may vary!

    (3) $c_1 = 2, c_2 = 1, x(1) + y(1) = 10e^{-1}$