Answer to GREEN Exam 2

1. **D**
2. **C**
3. **A**
4. **E**
5. **B**
6. **E**
7. **A**
8. (1) $T(t^2-1) = -1+3t^2$

   (2) $[T]_{\mathcal{B}} = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 1 \\ 1 & 2 & 4 \end{bmatrix}$

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

   Answer may vary!

   (2) $P = \begin{bmatrix} 1 & 1 & 0 \\ 1 & 0 & 1 \\ -1 & 0 & 2 \end{bmatrix}, D = \begin{bmatrix} 4 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$.

   Answer may vary!

10. (1) $\lambda_1 = 1, \boldsymbol{v}_1 = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$ $\lambda_2 = -2, \boldsymbol{v}_2 = \begin{bmatrix} 5 \\ -2 \end{bmatrix}$.

    Answer may vary!

    (2) $\begin{bmatrix} x(t) \\ y(t) \end{bmatrix} = c_1 \begin{bmatrix} e^t \\ -e^t \end{bmatrix} + c_2 \begin{bmatrix} 5e^{-2t} \\ -2e^{-2t} \end{bmatrix}$ for arbitrary constants c_1 and c_2.

    Answer may vary!

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