Answer to GREEN Exam

1. **D**
2. **C**
3. **E**
4. **D**
5. **A**
6. **B**
7. **A**
8. (1) $T(at^2+bt+c) = \begin{bmatrix} c & b \\ a+b+c & 2a+b \end{bmatrix}$

   (2) $p(t) = t^2 + 2t + 1$

   (3) $\left\{ \begin{bmatrix} 0 & 0 \\ 1 & 2 \end{bmatrix}, \begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}, \begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix} \right\}$ *is a basis for the range of* T. *(Answer may vary!)*

9. (1) $\lambda_1 = 4$, basis for the eigenspace $\left\{ \begin{bmatrix} 0 \\ -1 \\ 1 \end{bmatrix} \right\}$

   $\lambda_2 = \lambda_3 = 2$, basis for the eigenspace $\left\{ \begin{bmatrix} -3 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} -1 \\ 0 \\ 1 \end{bmatrix} \right\}$ (Answer may vary)

   (2) $P = \begin{bmatrix} 0 & -3 & -1 \\ -1 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$, $D = \begin{bmatrix} 4 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$ (Answer may vary)

10. (1) $\lambda_1 = 3, \mathbf{v}_1 = \begin{bmatrix} 5 \\ -6 \end{bmatrix}, \lambda_2 = 4, \mathbf{v}_2 = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$ (Answer may vary)

    (2) $\begin{bmatrix} x(t) \\ y(t) \end{bmatrix} = c_1 e^{3t} \begin{bmatrix} 5 \\ -6 \end{bmatrix} + c_2 e^{4t} \begin{bmatrix} 1 \\ -1 \end{bmatrix}$ (Answer may vary)

    (3) $c_1 = -1, c_2 = 6, x(1) + y(1) = e^3$