

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

(b)  $y(x) = c_1 e^x \cos(x) + c_2 e^x \sin(x) + x + 1$

2.  $y'(x) = \cos(2x) + \frac{1}{2} \sin(2x)$

3. (a) -12; (b) 8

4.  $(\frac{7}{10}, \frac{7}{5}, -\frac{3}{5})$

5. Basis:  $\left\{ \begin{pmatrix} -1 \\ 1 \\ 1 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 4 \\ -11 \\ 0 \\ -2 \\ 1 \end{pmatrix} \right\}$

6.  $\begin{pmatrix} \frac{1}{12} & -\frac{3}{4} \\ \frac{1}{12} & \frac{1}{4} \end{pmatrix}$

7. (a) True (b) False (c) True

8. No.

9.  $c_1 \begin{pmatrix} 1 \\ 0 \\ 2 \end{pmatrix} + c_2 \begin{pmatrix} -1 \\ 1 \\ 3 \end{pmatrix} + c_3 \begin{pmatrix} 2 \\ 2 \\ 2 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$  or  $\begin{pmatrix} 1 & -1 & 2 \\ 0 & 1 & 2 \\ 2 & 3 & 2 \end{pmatrix} \begin{pmatrix} c_1 \\ c_2 \\ c_3 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$

10. Show  $T$  is closed under both vector addition and scalar multiplication. ...