Name: Chen Chen
UID: 004710308
Dis 2A

4.1

21

$$\begin{bmatrix} t^2 & t|t| \\ 2t & 2|t| \end{bmatrix} = 2|t|t^2 - 2tt|t| = 0$$

So, it is linear dependent.

22

$$\begin{bmatrix} e^t & e^{-3t} \\ e^t & -3e^{-3t} \end{bmatrix} = -4e^{-2t}$$

$$y(0) = 1 = C_1e^0 + C_2e^{-3\times 0} = C_1 + C_2 = 1$$
$$y'(0) = -2 = C_1e^0 - C_2 3e^{-3\times 0} = C_1 - (-3)C_2$$
$$C_1 = \frac{1}{4}, C_2 = \frac{3}{4}$$

27

$$y_2(t) = y_1(t)x = xt$$
$$(xt)' = x't + x, (x't + x)' = x''t + 2x'$$
$$t^2(x''t + 2x') - 2t(x't + x) + 2xt = 0$$
$$\Rightarrow t^3x'' = 0 \Rightarrow x'' = 0 \Rightarrow x = t \Rightarrow y_2(t) = t^2$$
$$t^2(2) - 2t(2t) + 2t^2 = 0$$
$$y = C_1t + C_2t^2$$

4.3

6

$$6\lambda^2 + \lambda - 1 = 0 = (3\lambda - 1)(2\lambda + 1)$$
$$\lambda_1 = \frac{1}{3}, \lambda_2 = -\frac{1}{2}$$
$$y(t) = C_1e^{\frac{1}{3}} + C_2e^{-\frac{1}{2}}$$

8

$$6\lambda + 5\lambda - 6 = 0 = (2\lambda + 3)(3\lambda - 2)$$
$$\lambda_1 = \frac{2}{3}, \lambda_2 = -\frac{3}{2}$$
$$y(t) = C_1e^{\frac{2}{3}} + C_2e^{-\frac{3}{2}}$$

14

$$\lambda^2 + 2\lambda + 3 = 0$$
$$\lambda = -1 \pm \sqrt{2}i$$
$$y(t) = e^{-t}(C_1cos\sqrt{2}t + C_2sin\sqrt{2}t)$$

16

$$\lambda^2 + 2\lambda + 2 = 0$$
$$\lambda = -1 \pm i$$
$$y(t) = e^{-t}(C_1cost + C_2sint)$$