

HW MATH227/1 Solutions

1.

$$(a) \quad \begin{aligned} x &= t \\ y &= \frac{7}{5}t - \frac{3}{5} \end{aligned}$$

$$(b) \quad \begin{aligned} x_1 &= r \\ x_2 &= s \\ x_3 &= t \\ x_4 &= \frac{4}{3}r - \frac{1}{3}s + \frac{5}{6}t + \frac{1}{6} \end{aligned}$$

2.

$$(a) \quad \begin{bmatrix} 3 & -2 & -1 \\ 4 & 5 & 3 \\ 7 & 3 & 2 \end{bmatrix}$$

$$(b) \quad \begin{bmatrix} 1 & 2 & 0 & -1 & 1 & 1 \\ 0 & 3 & 1 & 0 & -1 & 2 \\ 0 & 0 & 1 & 7 & 0 & 1 \end{bmatrix}$$

3.

$$(a) \quad \begin{aligned} 3x_1 & & -2x_3 & = & 5 \\ 7x_1 & +x_2 & +4x_3 & = & -3 \\ & -2x_2 & +x_3 & = & 7 \end{aligned}$$

$$(b) \quad \begin{aligned} x_1 & & & = & 7 \\ & x_2 & & = & -2 \\ & & x_3 & = & 3 \\ & & & x_4 & = & 4 \end{aligned}$$

4.

$$(a) \quad \begin{aligned} x_1 &= -3 \\ x_2 &= 0 \\ x_3 &= 7 \end{aligned}$$

$$(b) \quad \text{No solution.}$$

5.

$$\begin{aligned} \begin{bmatrix} 2 & 1 & 3 \\ 0 & -2 & -29 \\ 3 & 4 & 5 \end{bmatrix} &\rightarrow \begin{bmatrix} 2 & 1 & 3 \\ 0 & -2 & -29 \\ 1 & 3 & 2 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 3 & 2 \\ 2 & 1 & 3 \\ 0 & -2 & -29 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 3 & 2 \\ 0 & 5 & 1 \\ 0 & -2 & -29 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 3 & 2 \\ 0 & 5 & 1 \\ 0 & 143 & 0 \end{bmatrix} \\ &\rightarrow \begin{bmatrix} 1 & 3 & 2 \\ 0 & 5 & 1 \\ 0 & 1 & 0 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 3 & 2 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 3 & 2 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 3 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \end{aligned}$$

6.

$$\begin{bmatrix} 1 & 3 \\ 0 & 1 \end{bmatrix}, \quad \begin{bmatrix} 1 & \frac{7}{2} \\ 0 & 1 \end{bmatrix}$$

7.

$$\begin{aligned} \lambda = 1 & \begin{cases} x_1 = t \\ x_2 = t \\ x_3 = 0 \end{cases} \\ \lambda = 2 & \begin{cases} x_1 = -\frac{1}{2}t \\ x_2 = 0 \\ x_3 = t \end{cases} \end{aligned}$$