Aaron Kreuter Quiz 7

$$\begin{bmatrix} 1 & -1 & 1 & -1 \\ 3 & 1 & 7 & 3 \\ 5 & -3 & 9 & 1 \\ -2 & 4 & 2 & 8 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & -1 & 1 & -1 \\ 0 & 4 & 4 & 6 \\ 0 & 2 & 4 & 6 \\ 0 & 2 & 4 & 6 \end{bmatrix}$$

$$\rightarrow \begin{bmatrix} 1 & -1 & 1 & -1 \\ 0 & 4 & 4 & 6 \\ 0 & 2 & 4 & 6 \\ 0 & 0 & 0 & 0 \end{bmatrix} \begin{bmatrix} 1 & -1 & 1 & -1 \\ 0 & 4 & 4 & 6 \\ 0 & 2 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

$\dim(\text{span}\{v_1, v_2, v_3, v_4\}) = 3$

2)

$$\begin{bmatrix} x & \sin x & \cos x \\ 1 & \cos x & -\sin x \\ 0 & -\sin x & -\cos x \end{bmatrix}$$

$$\det = 0 + \sin x \begin{vmatrix} x & \cos x \\ 1 & -\sin x \end{vmatrix} - \cos x \begin{vmatrix} x & \sin x \\ 1 & \cos x \end{vmatrix}$$

$$= \sin x(-x\sin x - \cos x) - \cos x(x\cos x - \sin x)$$

$$= -x\sin^2 x - \cancel{\sin x\cos x} - x\cos^2 x + \cancel{\cos x\sin x}$$

$$= -x(\sin^2 x + \cos^2 x)$$

$$\boxed{= -x}$$