Training Problems 6

The below exercises are based on Chapter 3 from the *Coding the Matrix* book by Philip Klein.

1. Multiply matrix X and Y:

$$X = \begin{bmatrix} 5 & 3 \\ -2 & 4 \\ 8 & 2 \\ 11 & 5 \end{bmatrix} \qquad Y = \begin{bmatrix} 5 & -8 & 3 & -1 & -3 \\ 11 & 13 & 5 & 2 & 4 \end{bmatrix}$$

2. Find the determinant of the following matrix:

$$\begin{bmatrix} 3 & 15 & 72 \\ 35 & 17 & -28 \end{bmatrix}$$

3. Find the determinant of the following matrix:

$$\begin{bmatrix} 22 & 44 & 0 & -1 \\ 15 & 3 & 0 & 72 \\ 19 & 35 & 0 & -28 \\ -32 & 55 & 0 & 7 \end{bmatrix}$$

4. Find the determinant of the following matrix:

$$\begin{bmatrix} 20 & 5 & 0 & 0 \\ 6 & 2 & 0 & 4 \\ 2 & 3 & 2 & 0 \\ 2 & 2 & 2 & 2 \end{bmatrix}$$

5. Let v_1 = [3, 5, 2] and v_2 = [8, 6, 7]. Use matrices to find coefficients k_1 and k_2 that would produce the linear combination vector of [42, 48, 33].

6. Let v_1 = [1, 2, 0], v_2 = [3, 1, 1], and w = [4, -7, 3]. Determine whether w belongs to Span(v_1, v_2).

7. Let v_1 = [1, 2, 0], v_2 = [3, 1, 1], and w = [4, -7, 4]. Determine whether w belongs to Span(v_1, v_2).