Name: **Tutorial day and time:**

Select one *completed* problem for feedback:

1. For the matrices

$$A = \begin{bmatrix} 2 & -3 & 3 \\ 1 & 0 & 5 \end{bmatrix}, B = \begin{bmatrix} 2 & 0 \\ 1 & -4 \end{bmatrix}, C = \begin{bmatrix} 2 & 0 \\ -1 & 4 \\ 3 & 2 \end{bmatrix},$$

determine which of the products $A^2, AB, AC, BA, B^2, BC, CA, CB, C^2$ are defined. Compute at least **three** of the products that are defined.

Note: Matrix multiplication is an essential skill for the remainder of this course. I strongly recommend confirming that you're doing things correctly before you leave tutorial.

2. Determine the matrix of the transformation $T : \mathbb{R}^4 \to \mathbb{R}^3$ such that

$$T\left(\begin{bmatrix}1\\0\\0\\0\end{bmatrix}\right) = \begin{bmatrix}2\\0\\1\end{bmatrix}, T\left(\begin{bmatrix}0\\1\\0\\0\end{bmatrix}\right) = \begin{bmatrix}0\\-1\\3\end{bmatrix}, T\left(\begin{bmatrix}0\\0\\1\\0\end{bmatrix}\right) = \begin{bmatrix}1\\7\\5\end{bmatrix}, \text{ and } T\left(\begin{bmatrix}0\\0\\0\\1\end{bmatrix}\right) = \begin{bmatrix}3\\-1\\4\end{bmatrix}.$$

3. Determine the matrix of the transformation $T : \mathbb{R}^2 \to \mathbb{R}^2$ that performs the following operations, in order: First, a horizontal stretch by a factor of 4. Second, a counter-clockwise rotation by $3\pi/4$. Third, a reflection across the x-axis.

4. For fun: Find a 2×2 matrix A such that A^{12} is the identity matrix, but A^k is not for $1 \leq k \leq 11$. (Hint: rotation.)