There are two special problems labeled A and B, with B having three parts. After that, there are some book problems to hand in, and I recommend extra practice that isn't handed in.

In Mathematica, we've explored many kinds of 2D transformations: shearing, rotating, etc. One kind we haven't explored is translation. Translation is a transformation where the entire plane is shifted by a certain constant amount. For example, if we transform every 2D vector $\vec{v}$ to $\vec{v} + \begin{bmatrix} 2 \\ 1 \end{bmatrix}$, that's a translation that shifts everything 2 to the right and 1 up.

Problem A. Can you find a 2×2 matrix A, whose geometric effect is translation of the plane by $\begin{bmatrix} 2 \\ 1 \end{bmatrix}$? If so, then tell me A. If not, then explain why A cannot exist.

Problem B.A. I'm thinking of a 4×3 matrix A. All I'm going to tell you about A is that

$$A \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 2 \\ 7 \\ -3 \\ 1 \end{bmatrix}, \quad A \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 4 \\ 4 \\ 1 \end{bmatrix}, \quad A \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} = \begin{bmatrix} 2 \\ 0 \\ 1 \\ 7 \end{bmatrix}.$$

Is this enough information, for you to figure out what A is?

Problem B.B. I'm thinking of a 4×3 matrix B. All I'm going to tell you about B is that

$$B \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 2 \\ 7 \\ -3 \\ 1 \end{bmatrix}, \quad B \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 4 \\ 4 \\ 1 \end{bmatrix}, \quad B \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix} = \begin{bmatrix} 2 \\ 0 \\ 1 \\ 7 \end{bmatrix}.$$

Is this enough information, for you to figure out what B is?

Problem B.C. I'm thinking of a 4×3 matrix C. All I'm going to tell you about C is that

$$C \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 2 \\ 7 \\ -3 \\ 1 \end{bmatrix}, \quad C \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 4 \\ 4 \\ 1 \end{bmatrix}, \quad C \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix} = \begin{bmatrix} 2 \\ 0 \\ 1 \\ 7 \end{bmatrix}.$$

Is this enough information, for you to figure out what C is?

Section 2.1 #5, 6. Compute each answer just once, not twice as the book requests. By the way, it's not a bad idea to read the "row-column rule" treatment of matrix multiplication.

Section 2.1 #7, 8, 10, 12, 14.

Finally, if you are not yet fast at multiplying matrices by vectors, or matrices by matrices, then practice. (But don't submit your practice for grading.)