# Project 1, Transformations

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## 1

**Matrices defined**: $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 0 & 2 & -1 \\ 1 & 1 & 10 \end{bmatrix}$, $V = \begin{bmatrix} 1 & 4 & 0 \end{bmatrix}$

When `show(A), show(B), show(V)` was input into the python terminal, the output from Sagemath was $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, $\begin{bmatrix} 0 & 2 & -1 \\ 1 & 1 & 10 \end{bmatrix}$, $\begin{bmatrix} 1 & 4 & 0 \end{bmatrix}$ respectively. The matrices were repeated back to me as I originially entered them

$$\text{For } QQ \to RR \Rightarrow \begin{bmatrix} 1.00000000000000 & 3.00000000000000 \\ 2.00000000000000 & 4.00000000000000 \end{bmatrix}$$

$$\text{For } QQ \to RDF \Rightarrow \begin{bmatrix} 1.0 & 2.0 \\ 3.0 & 4.0 \end{bmatrix}$$

$RR$ and $RDF$ seem to be data types for the matrices. $RR$ appears to be an aribtrary precision floating point, outputting the maximum number of decimal places allowed. It won't be as precise as $QQ$, which is symbolic math, nor will it be as fast as $RDF$, but it will get you a decimal answer when youre looking for one.

$$\text{RREF}(B) = \begin{bmatrix} 1 & 0 & \frac{21}{2} \\ 0 & 1 & -\frac{1}{2} \end{bmatrix}$$

The command creates an identity matrix of the degree of the input.

For the original command: $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$ For input = 2: $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ For input = 5: $\begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$

# 2

**New matrices defined**: $C = \begin{bmatrix} 3 & 7 \\ 1 & 6 \end{bmatrix}$

In SageMath, to add: `A+C` results in $\begin{bmatrix} 4 & 9 \\ 4 & 10 \end{bmatrix}$, to subtract `A-C` results in $\begin{bmatrix} -2 & -5 \\ 2 & -2 \end{bmatrix}$

Lastly, to multiply: `A*C` results in $\begin{bmatrix} 5 & 19 \\ 13 & 45 \end{bmatrix}$, bonus: `det(A*C)` results in -22

$$B^T = \begin{bmatrix} 0 & 1 \\ 2 & 1 \\ -1 & 10 \end{bmatrix}$$

# 3

# 4

# 5