State after Four Elimination Steps
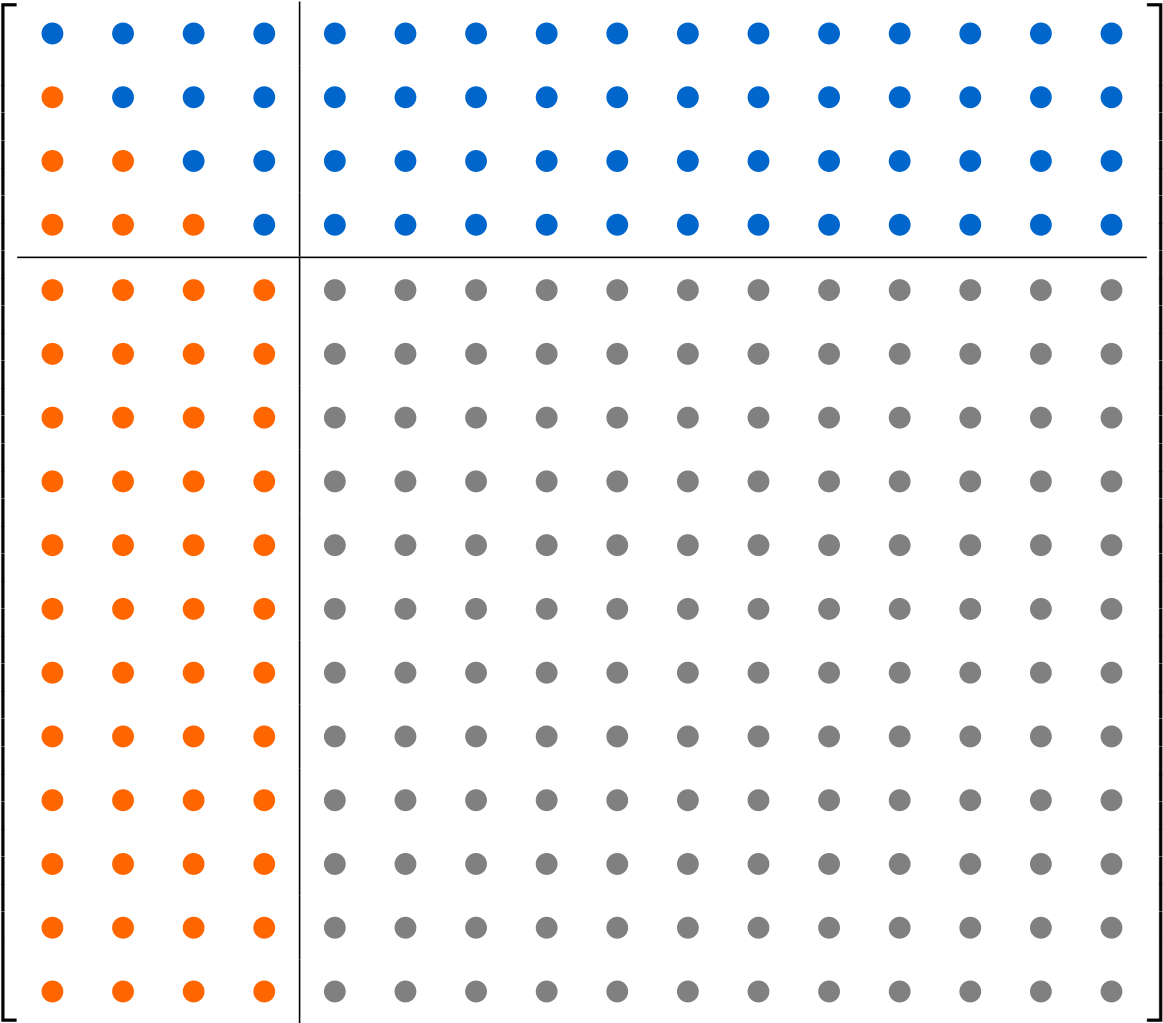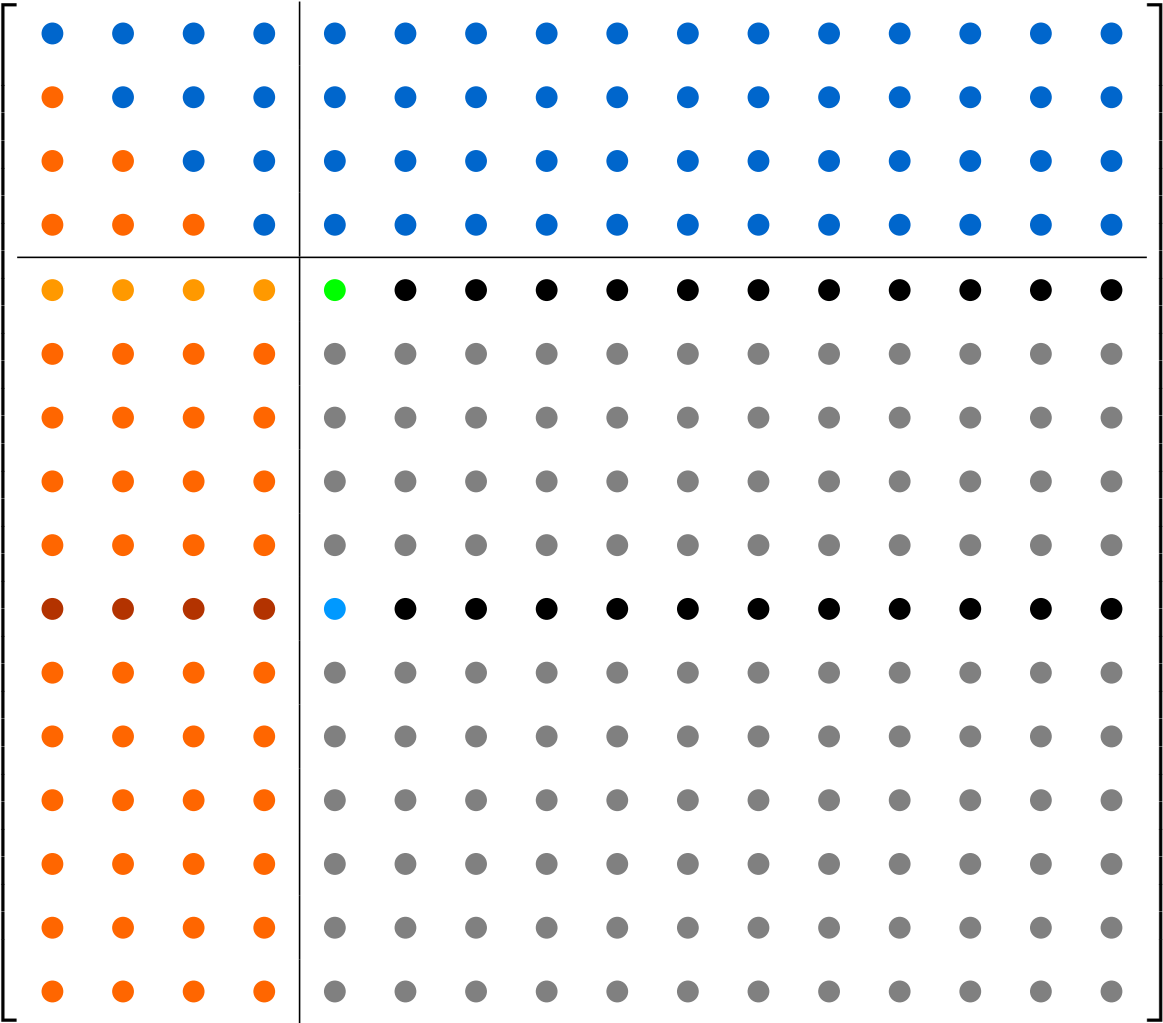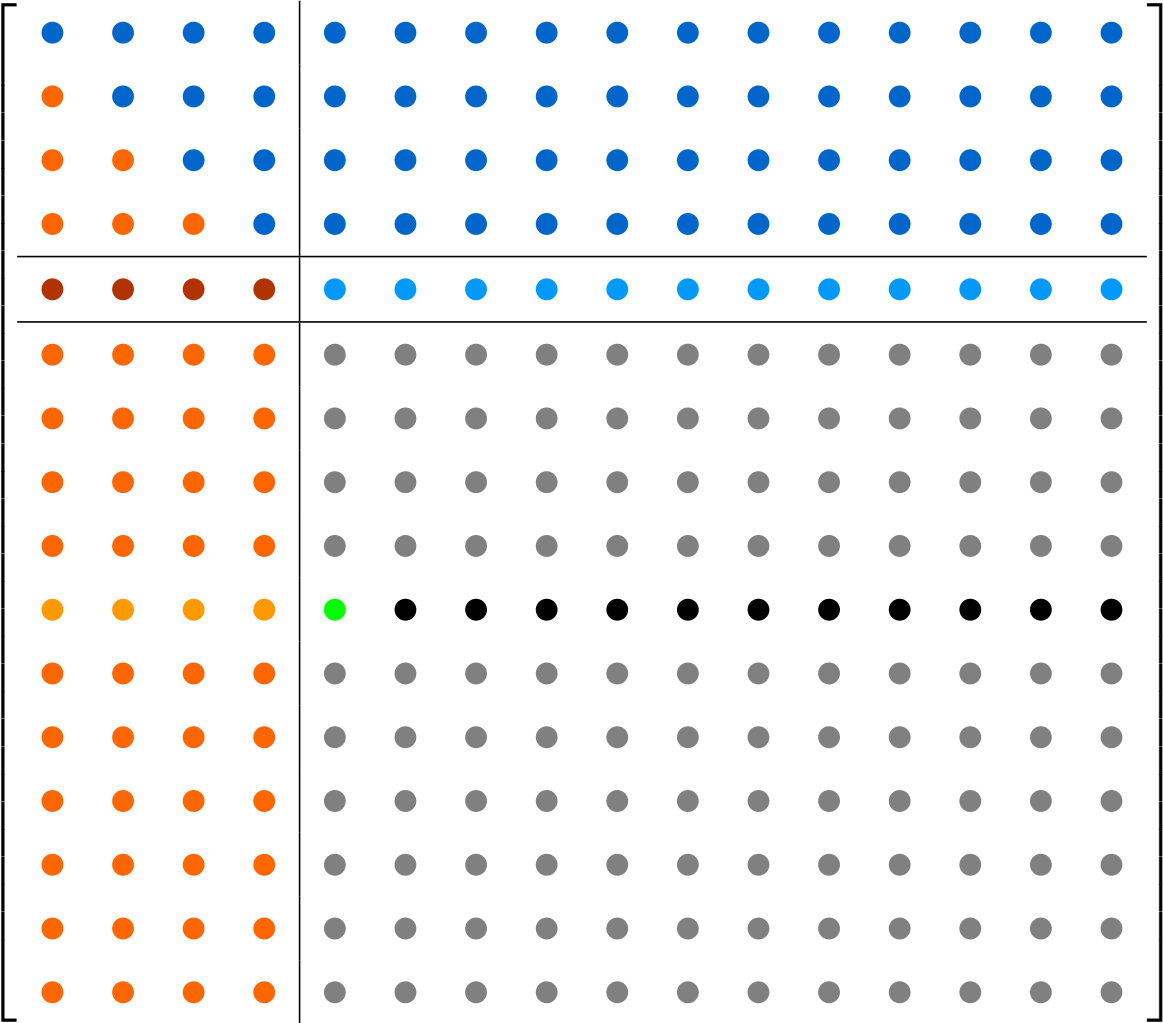
Find Largest Entry in Pivot Column
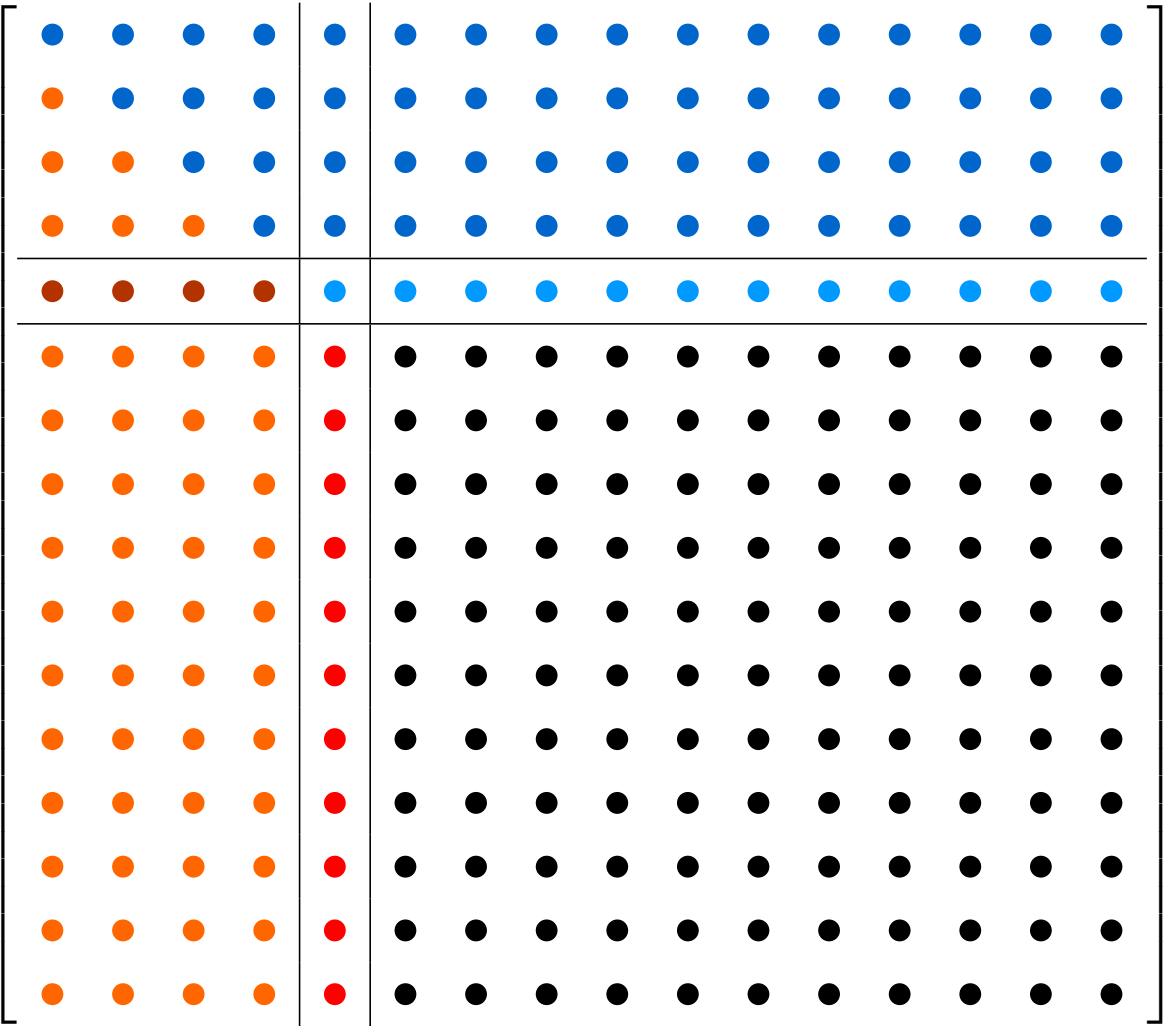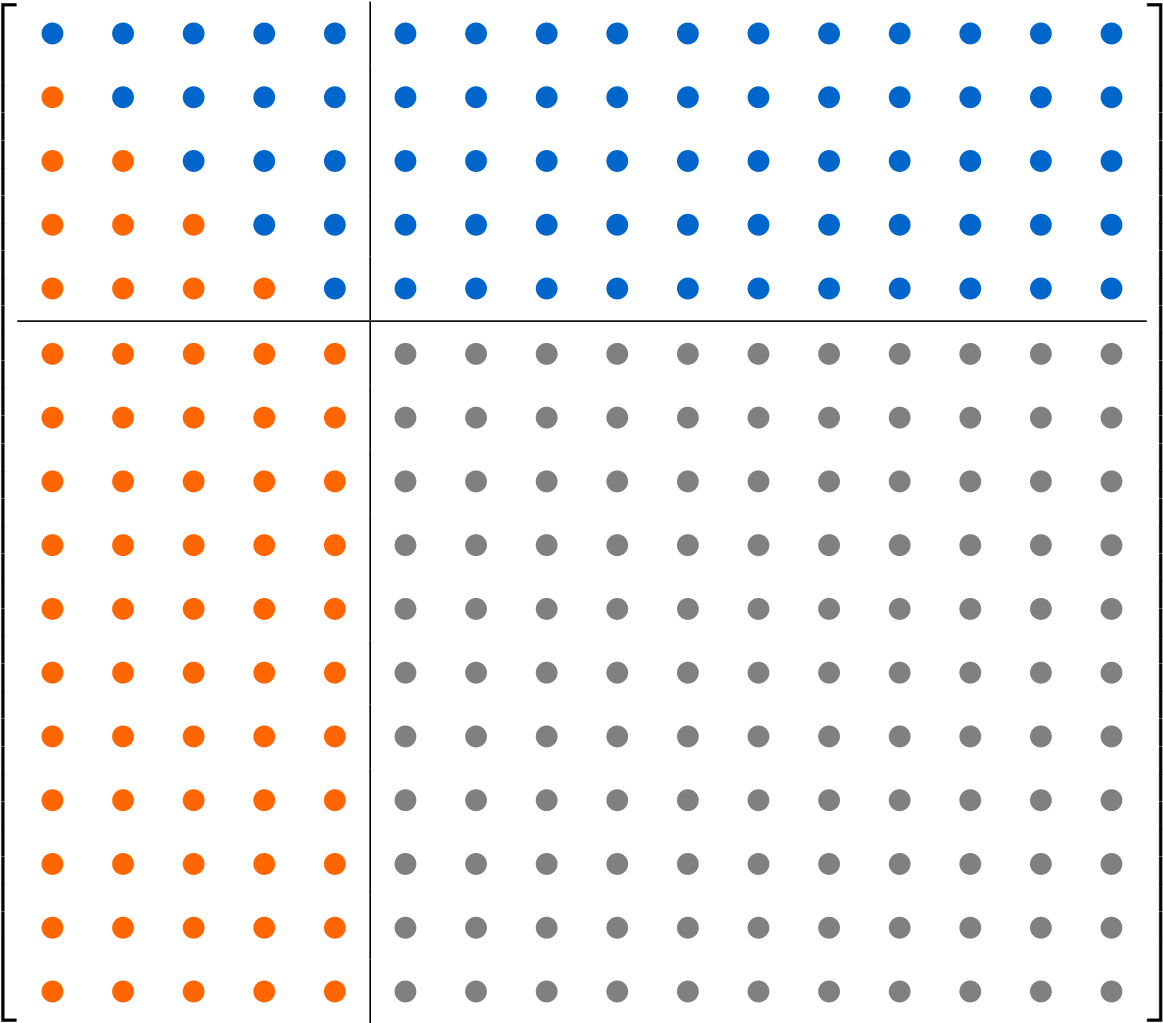
Interchange Rows

Compute Multipliers / Scale Column

Eliminate Pivot Column by Subtracting Rows /
/ Form Schur Complement with Row One Modification

State after Five Elimination Steps

State after One Block Elimination Step
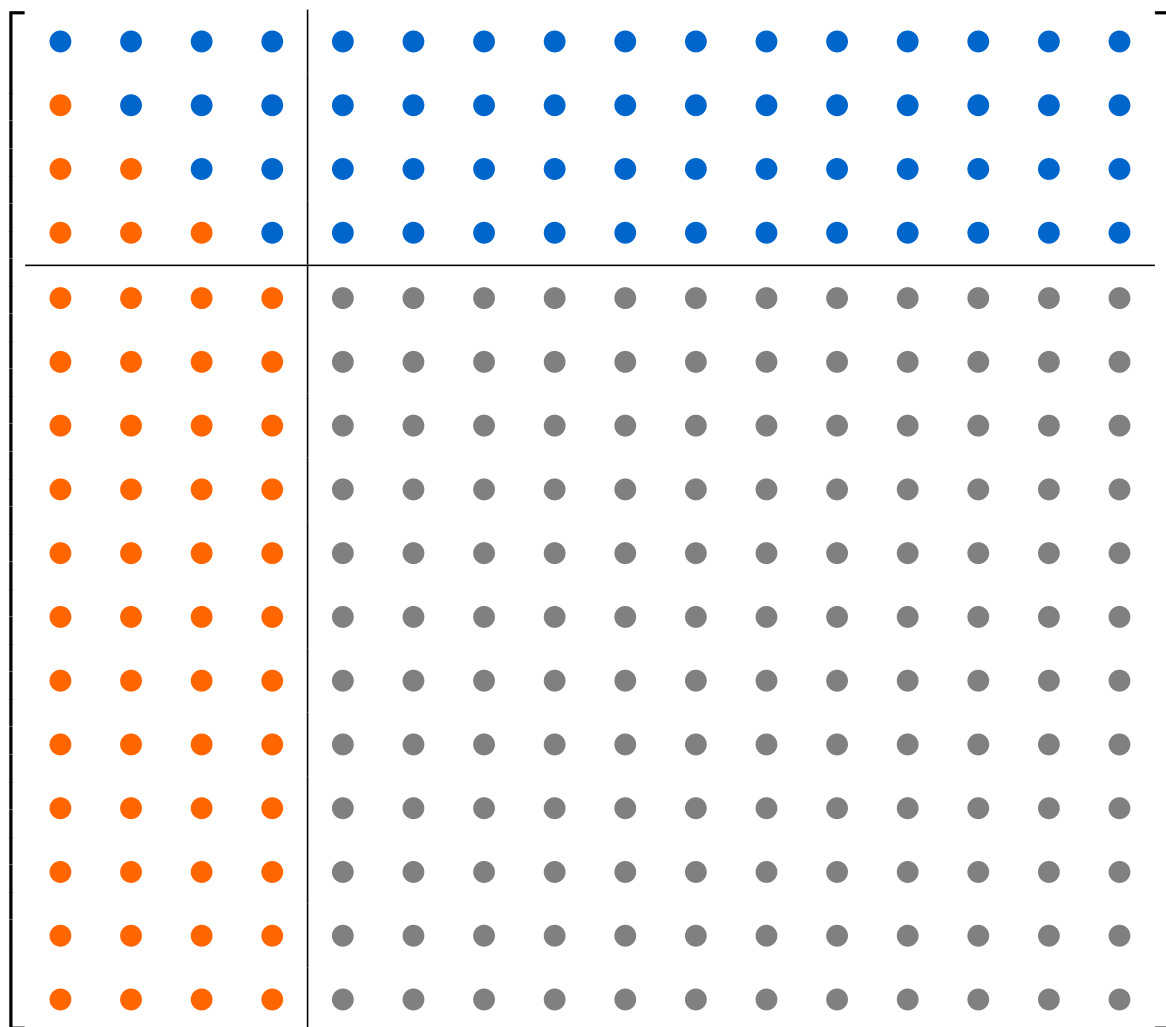
Goal after Next Block Elimination Step
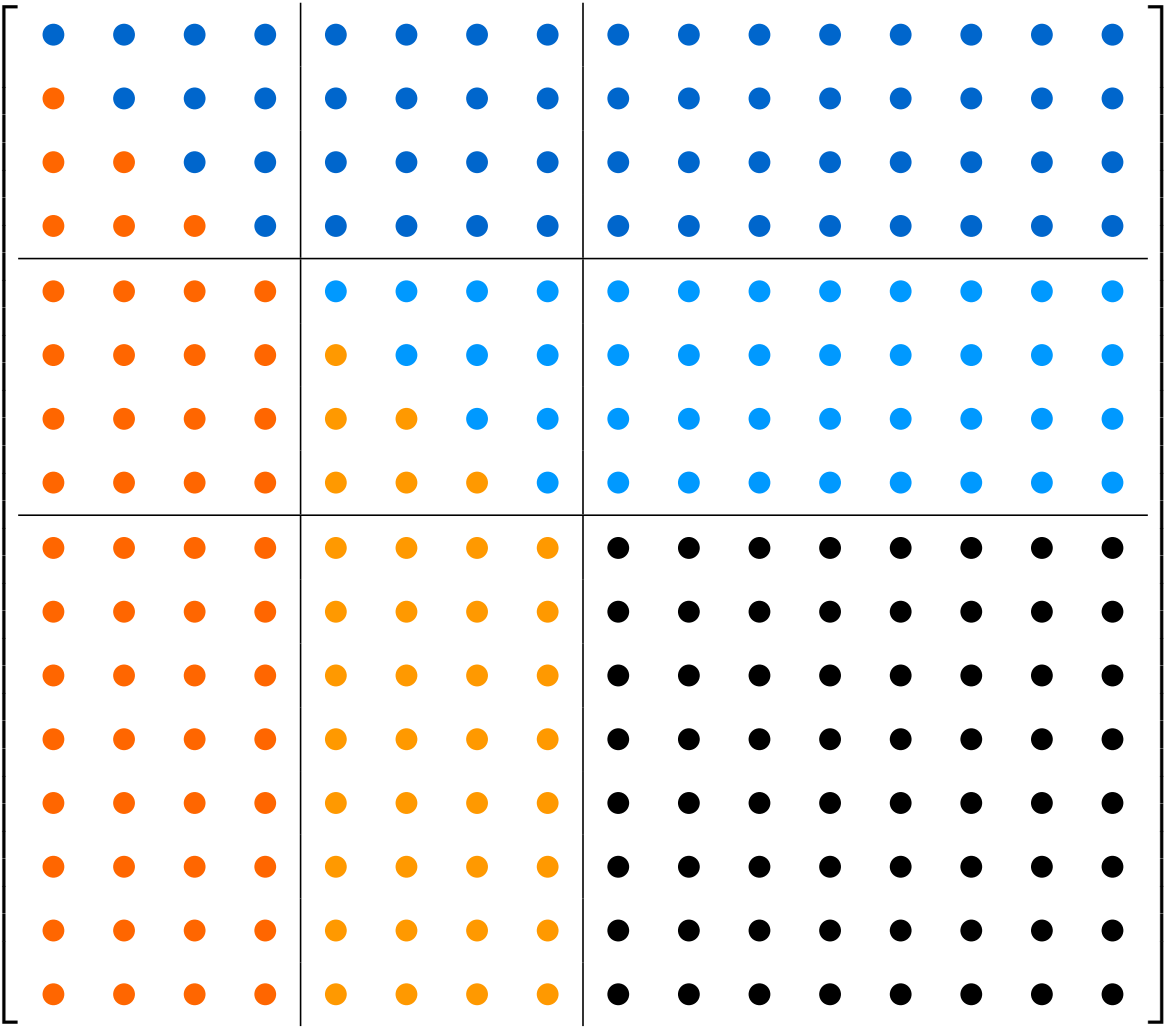
Find Largest Entry in Pivot Column
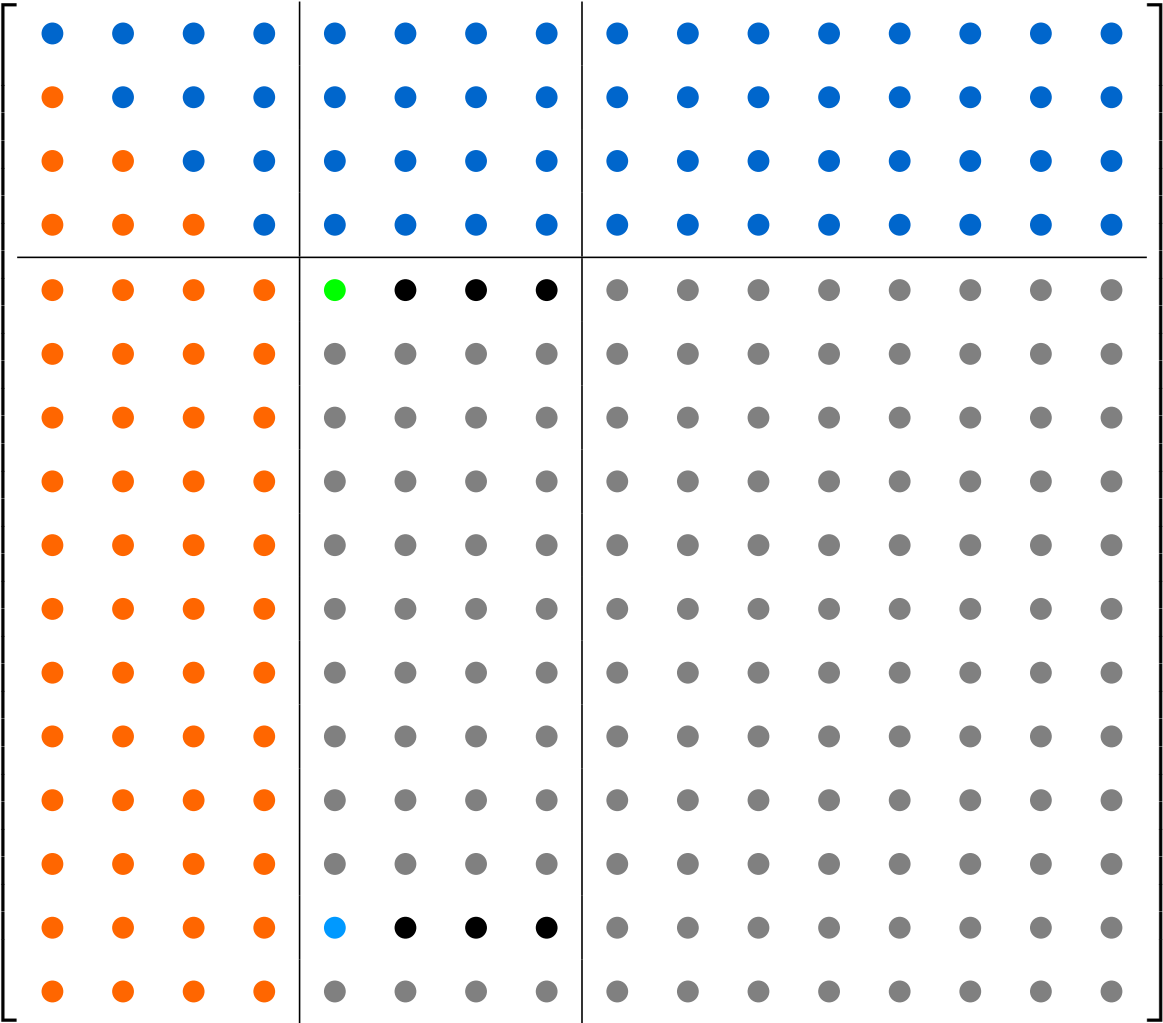
Interchange Rows in Panel
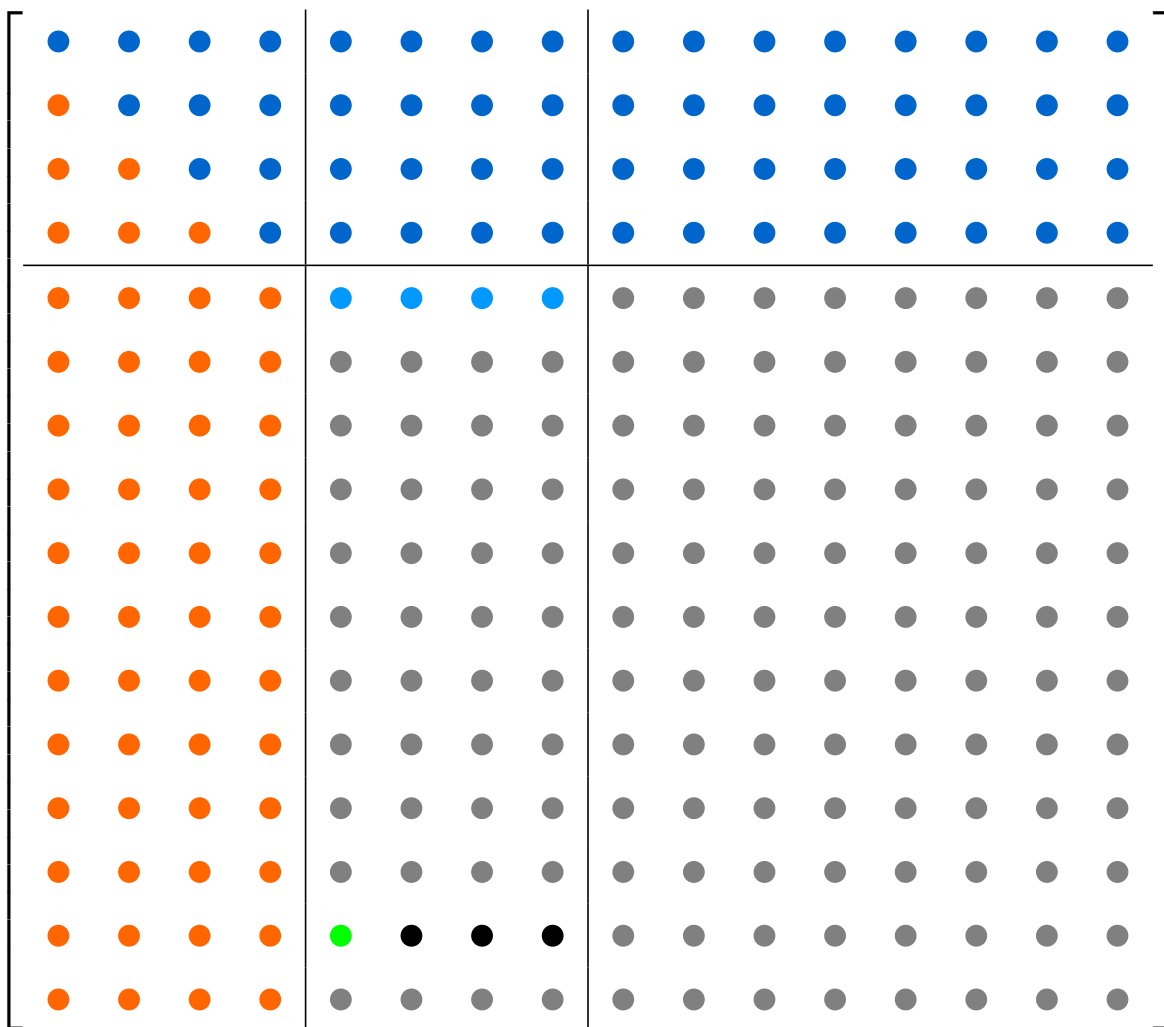
Compute Multipliers / Scale Column
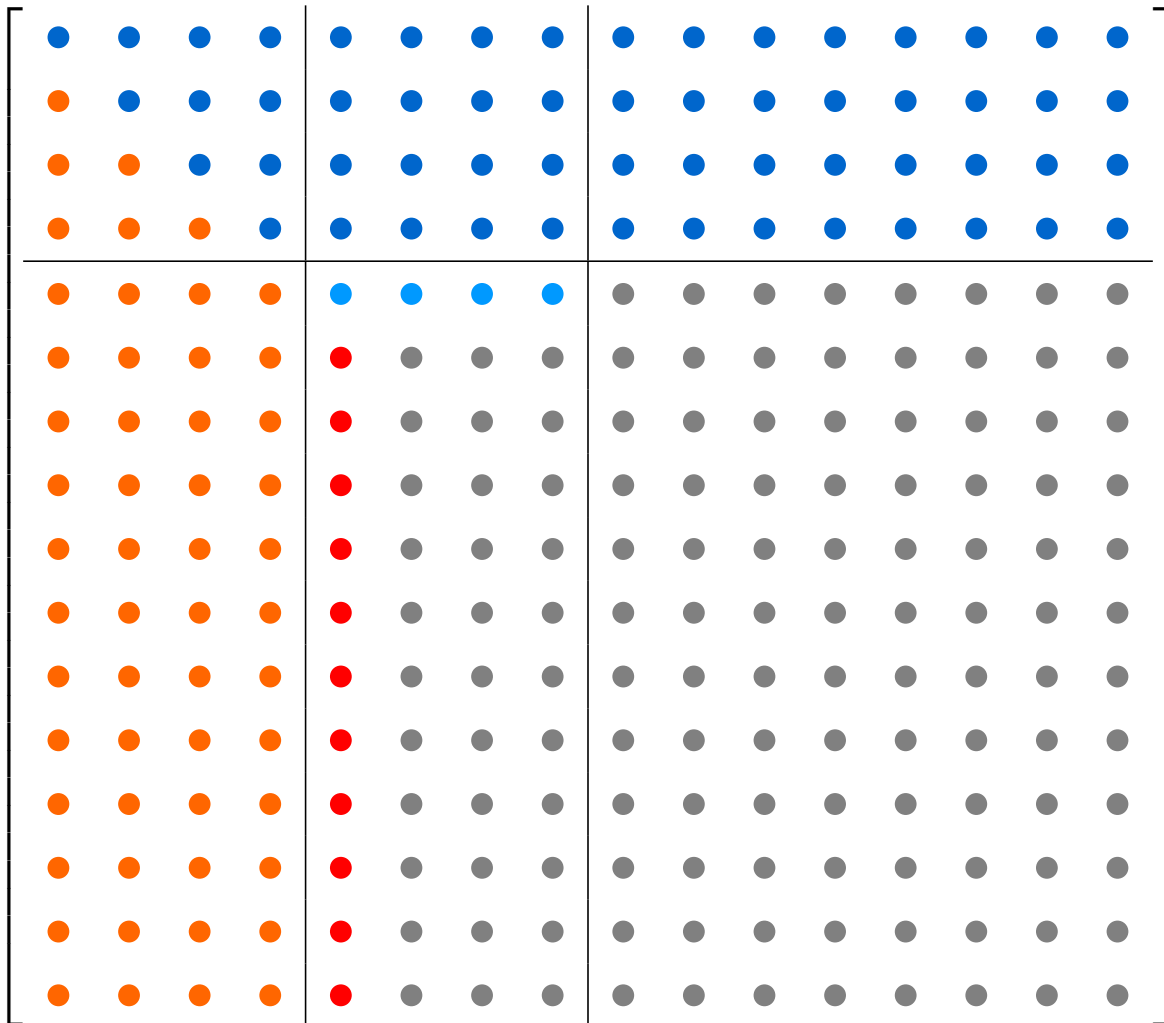
Within Panel, Eliminate Pivot Column by Subtracting Rows / Row One Modification
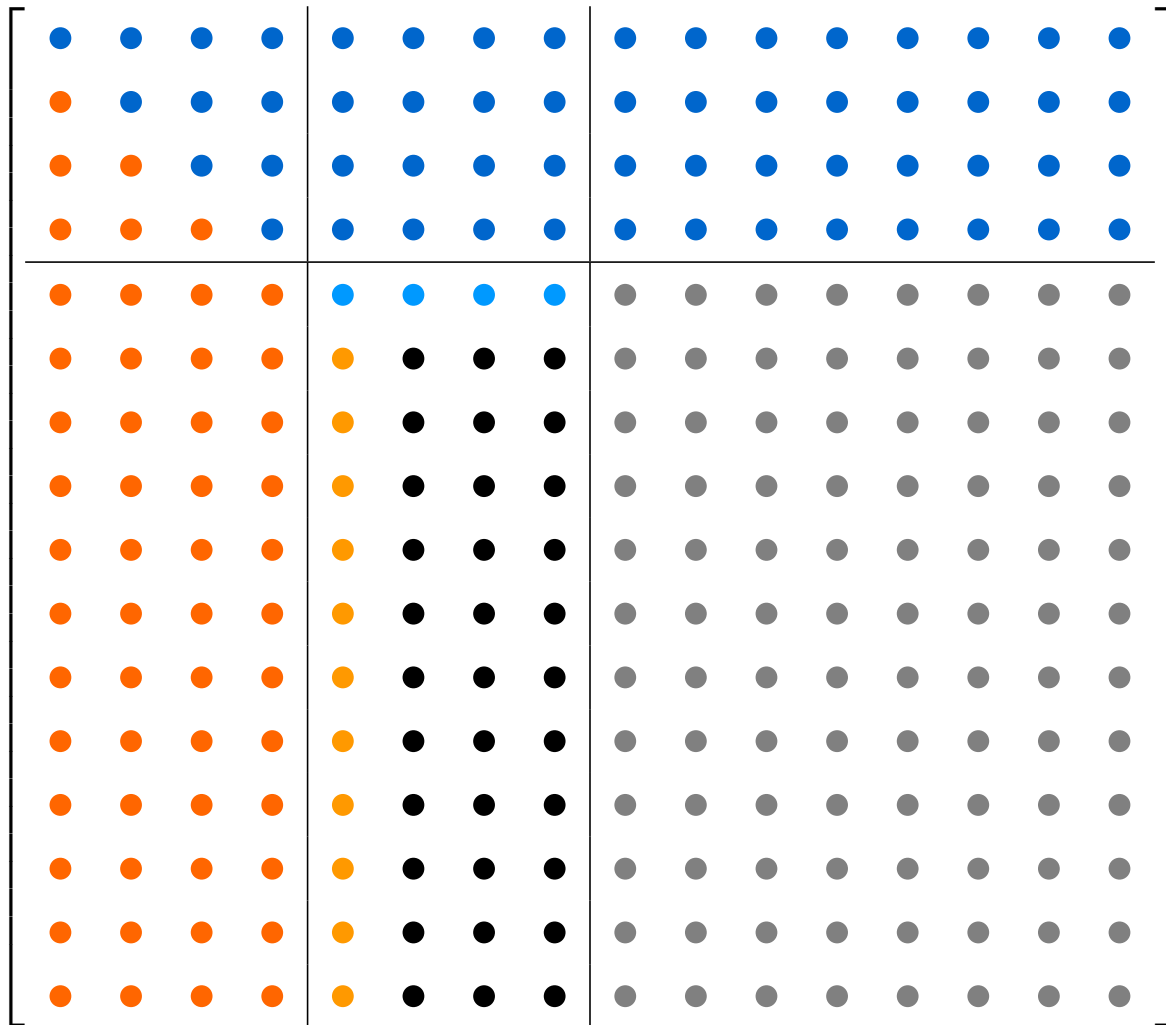
Find Largest Entry in Pivot Column
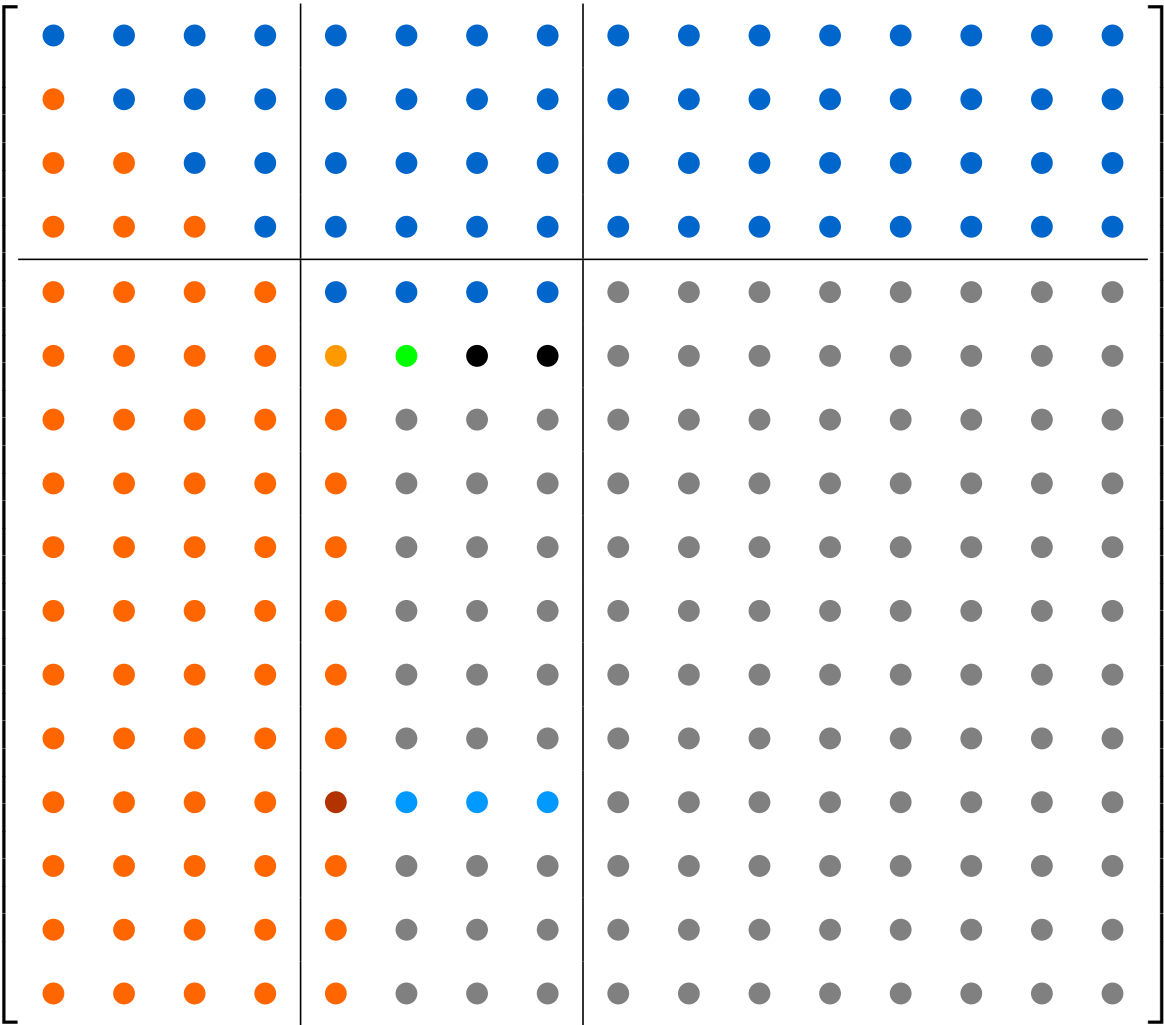
Interchange Rows in Panel
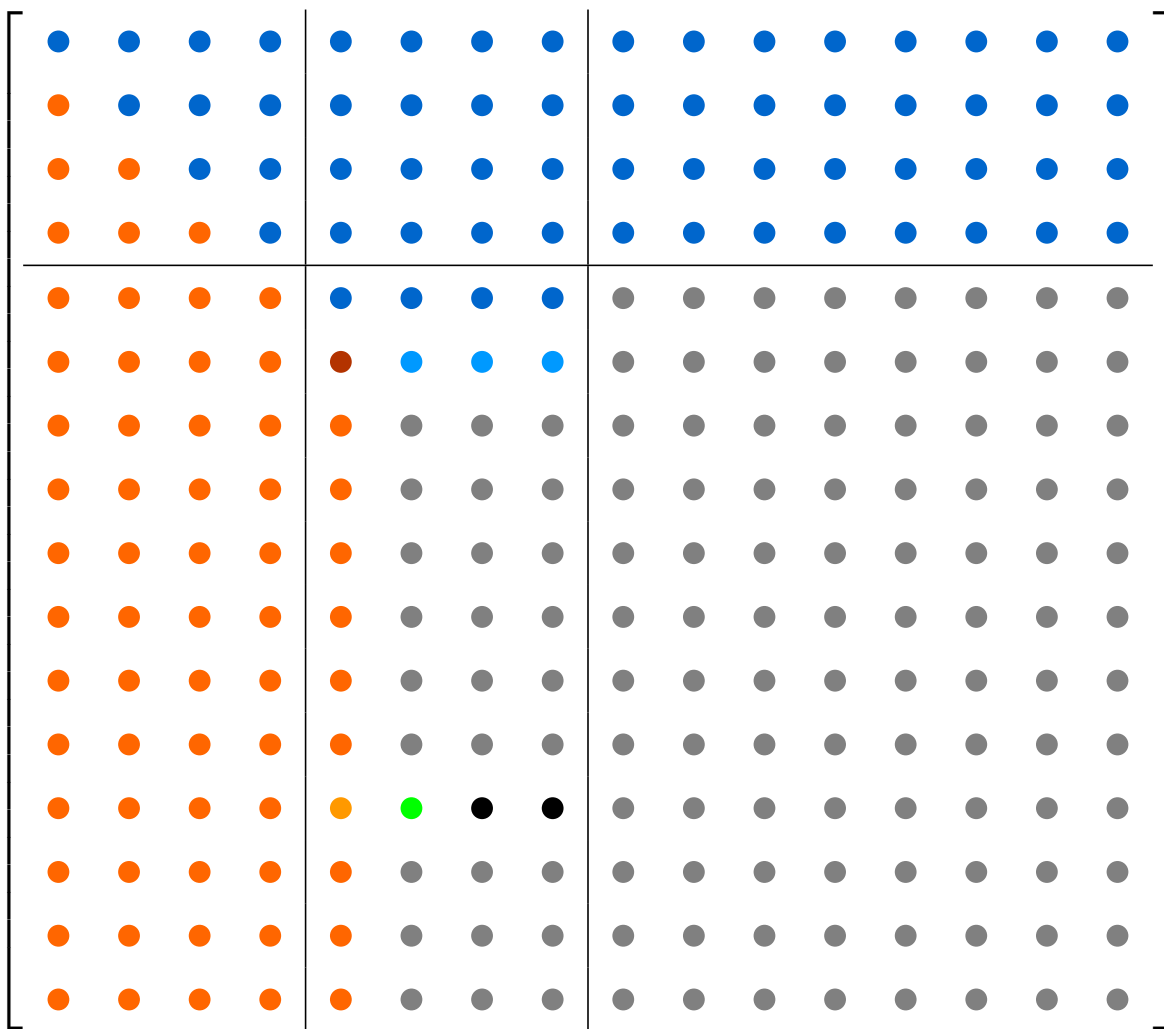
Compute Multipliers / Scale Column
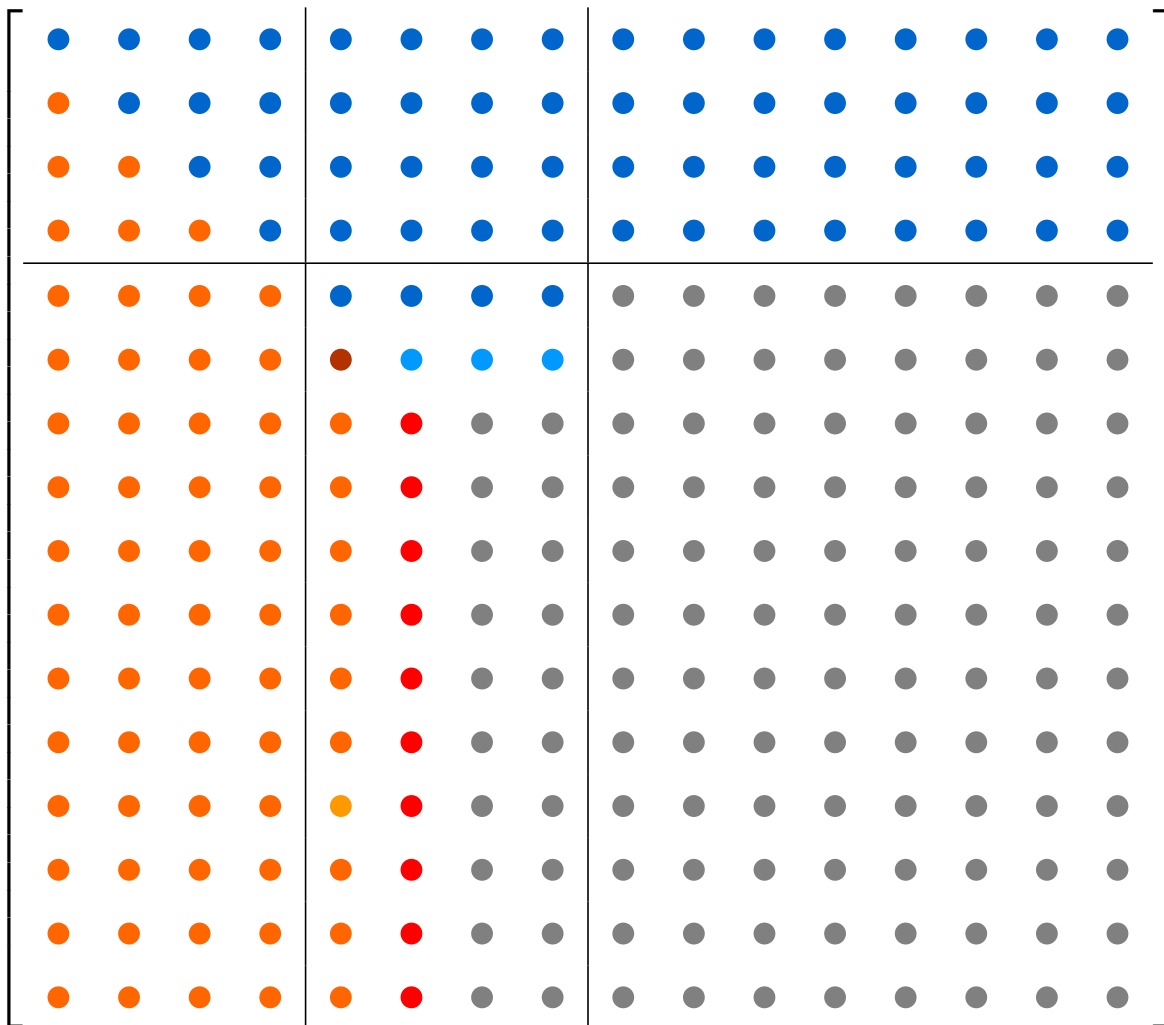
In Panel, Row One Modification
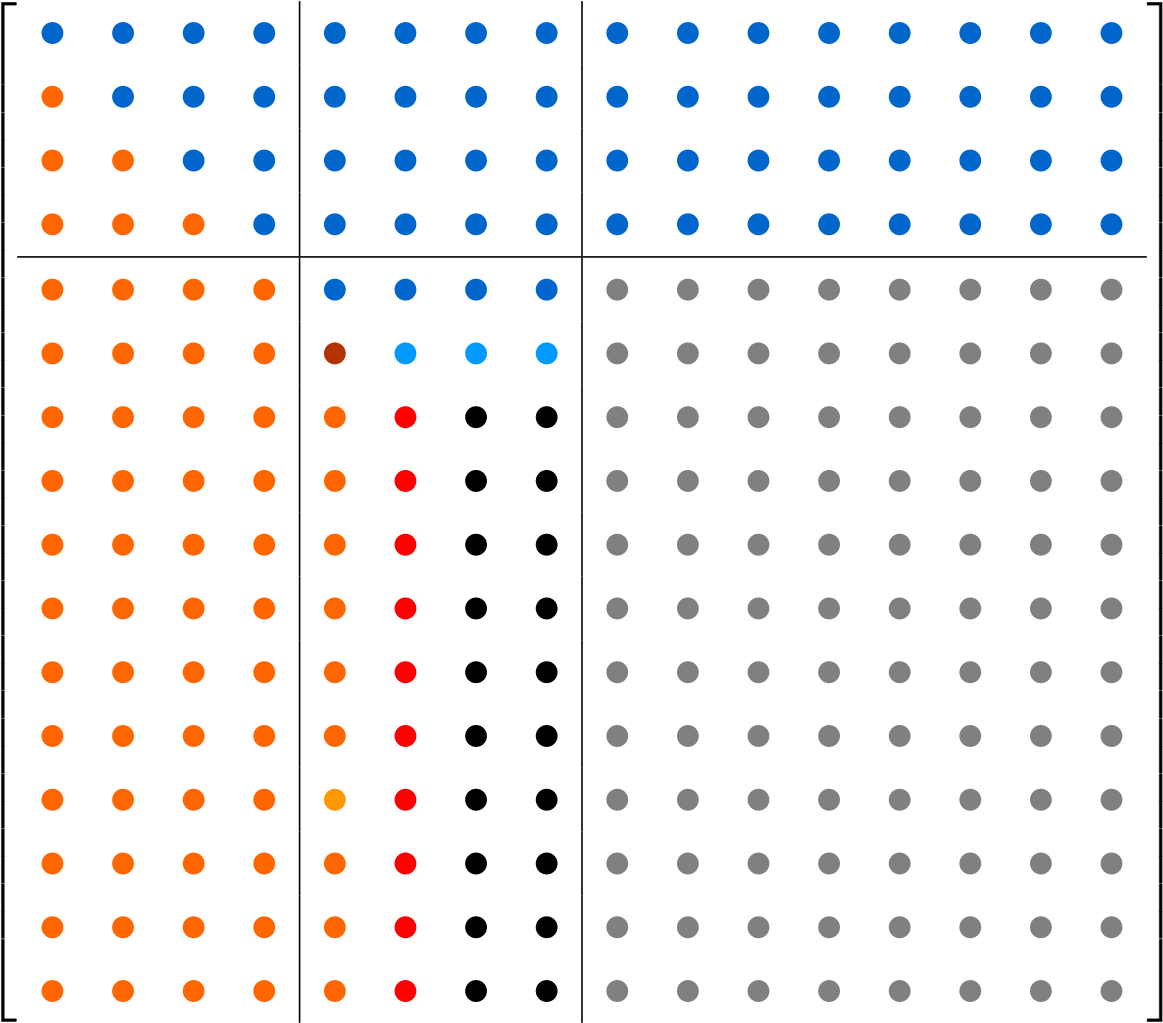
Find Largest Entry in Pivot Column
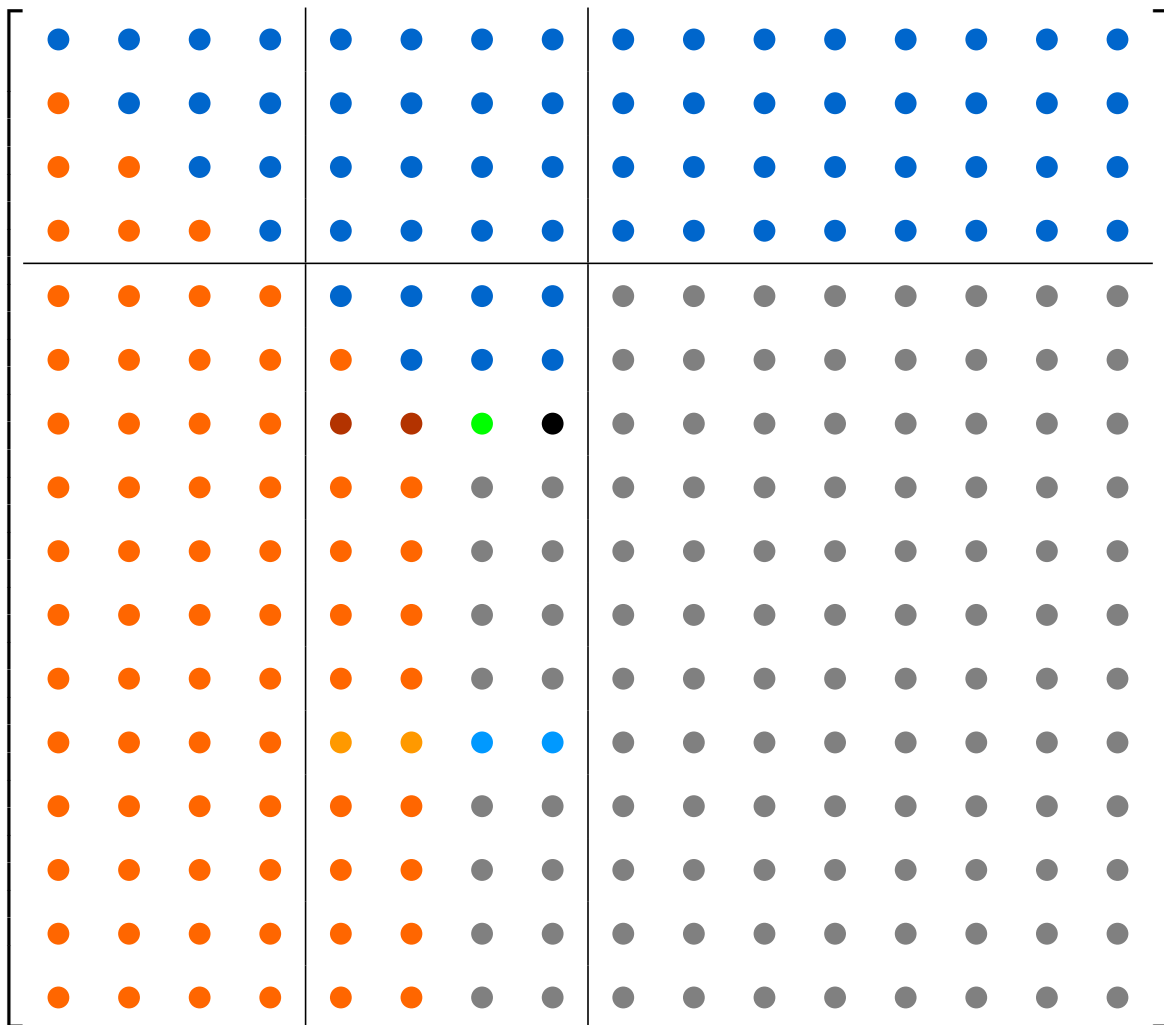
Interchange Rows in Panel
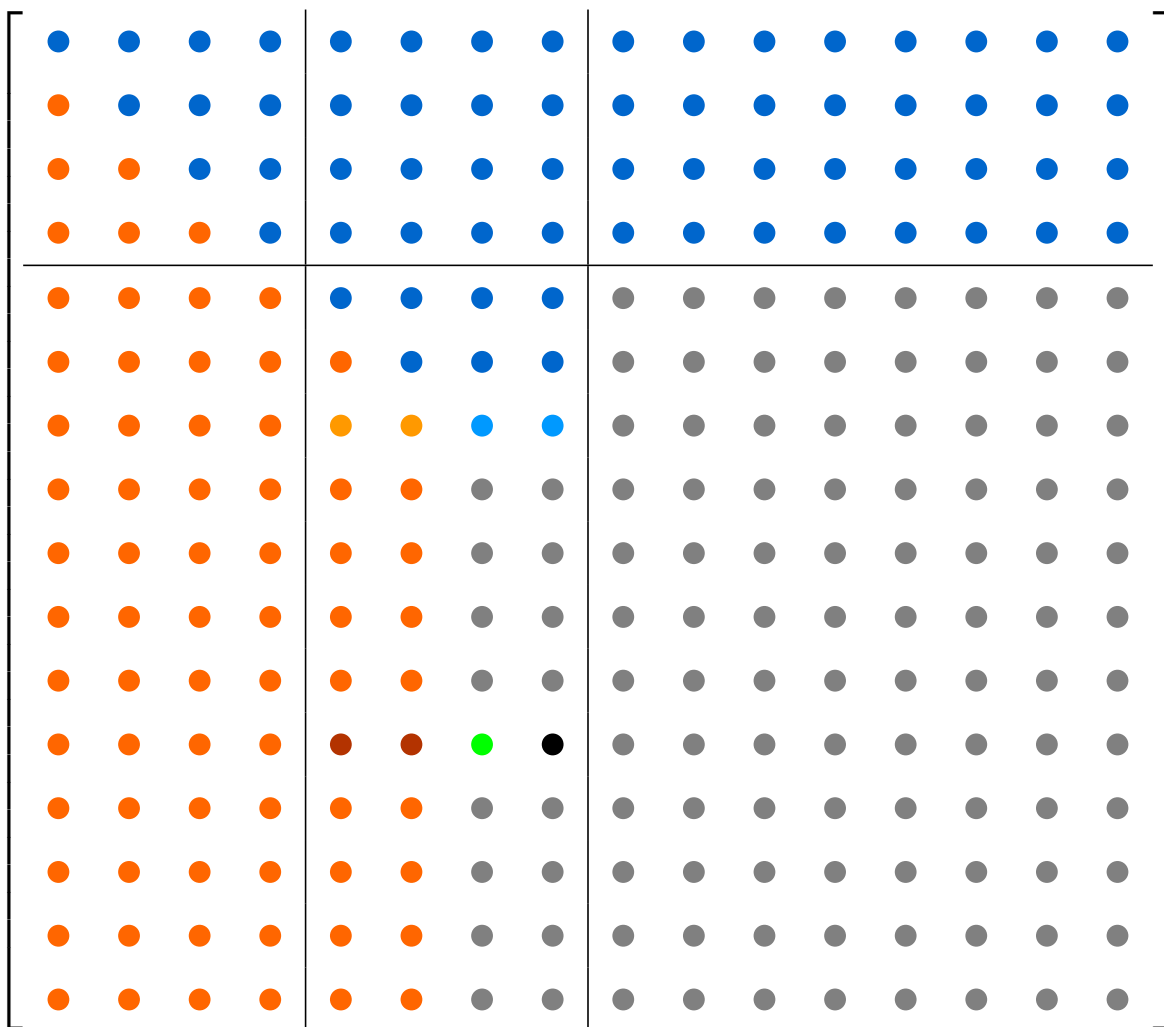
Scale Column
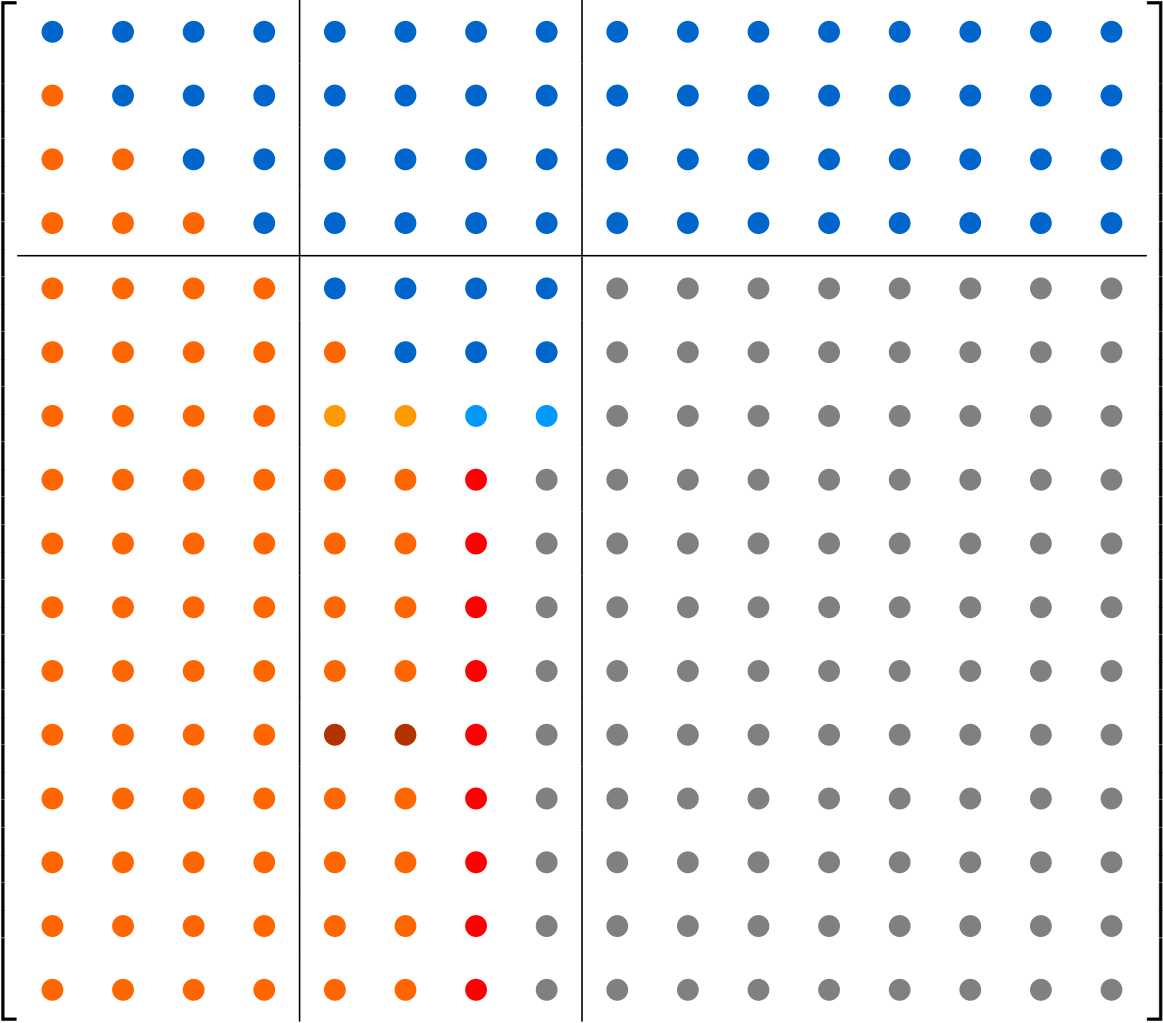
Rank One Modification in Panel
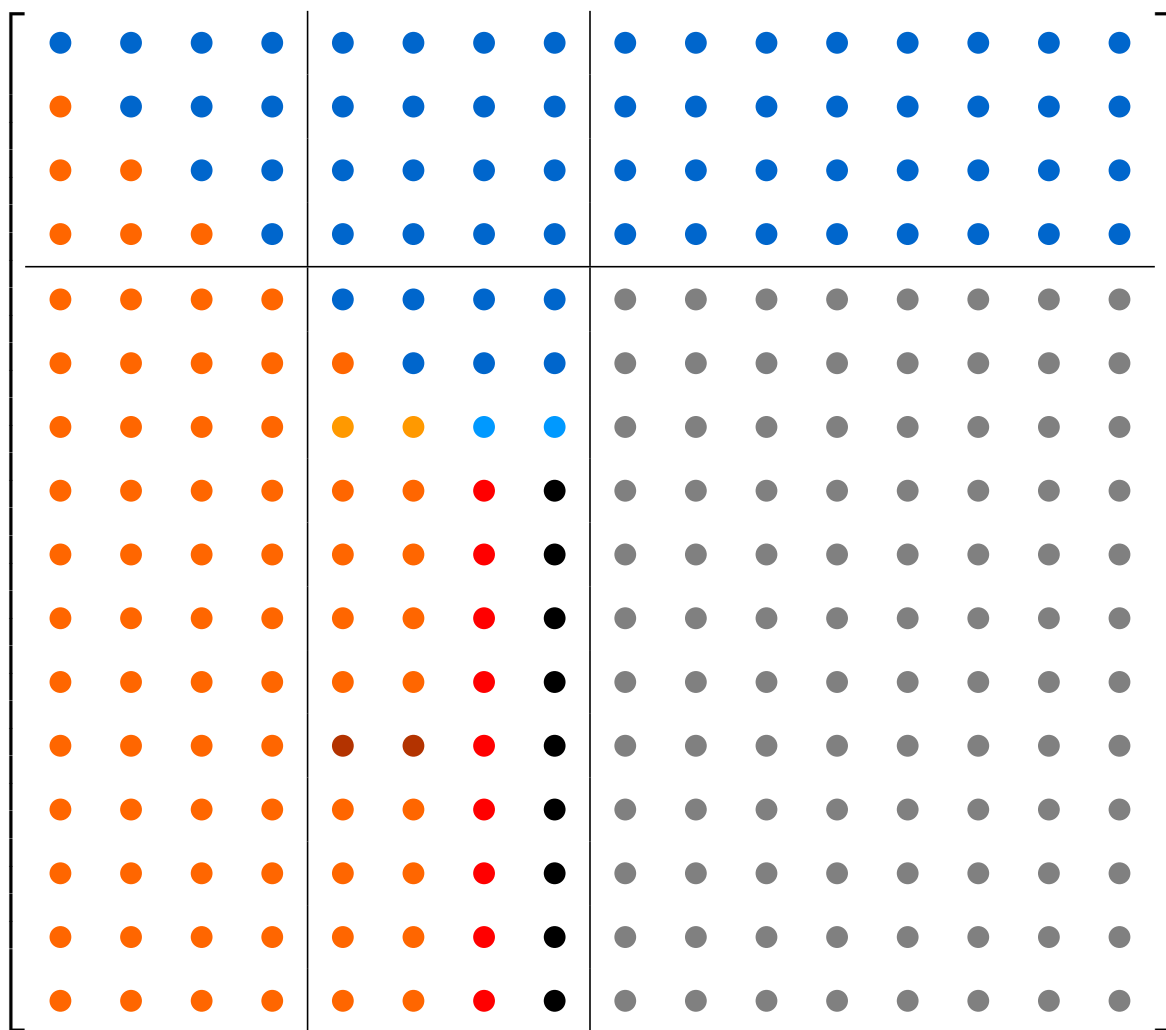
Find Largest Entry in Pivot Column
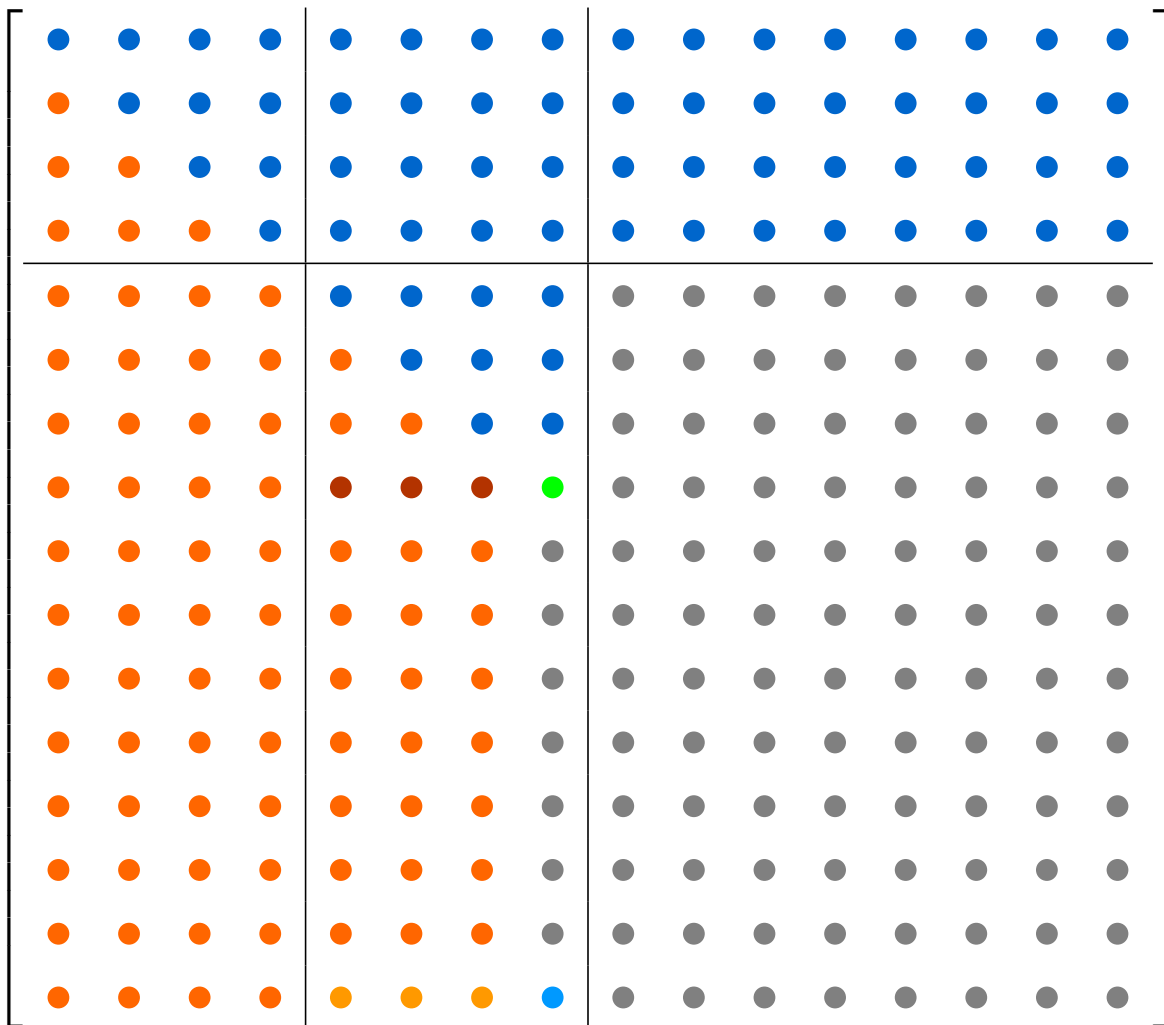
Interchange Rows in Panel
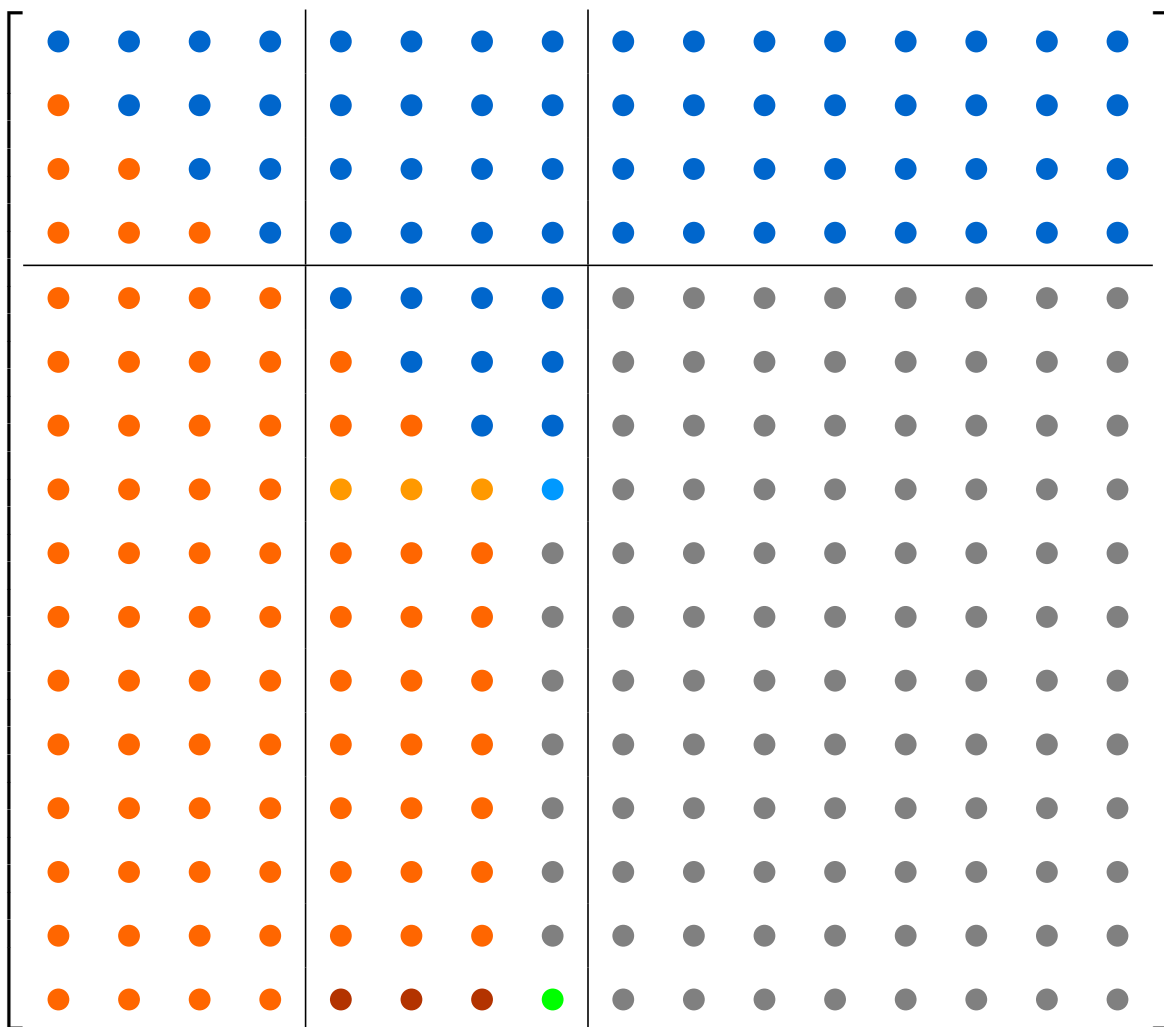
Scale Pivot Column
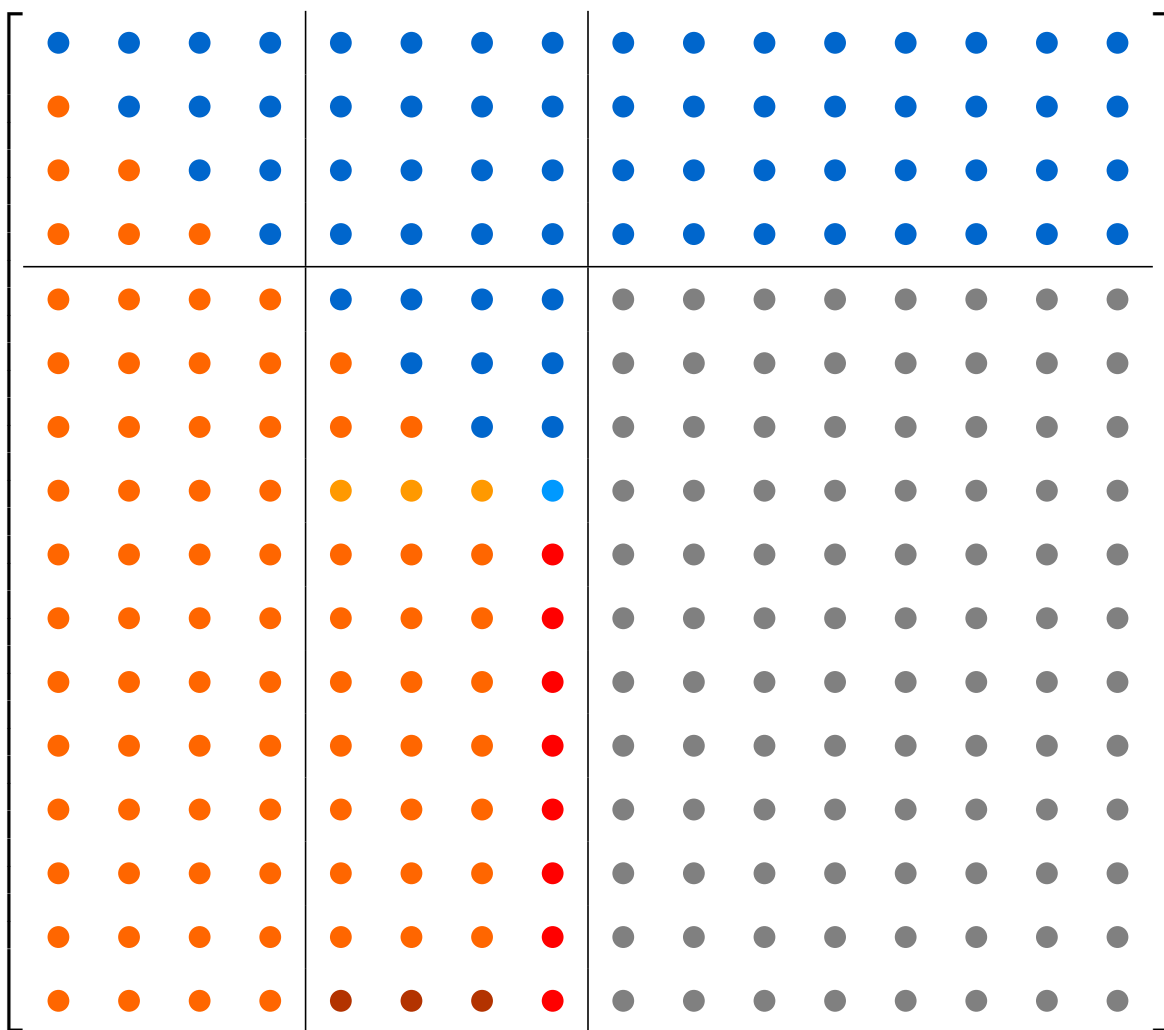
How to Move the Block Step Forward?

How to Move the Block Step Forward?

$$\begin{bmatrix} L_{11}, U_{11} & U_{12} & U_{13} \\ L_{21} & L_{22}, U_{22} & A_{23} \\ L_{31} & L_{32} & A_{33} \end{bmatrix}$$

- **Need to apply row interchanges to**

  L_{21}, L_{22}, A_{23} **and** A_{33}

- **Need to transform** A_{23} **into** U_{23}

- **Need to compute Schur complement**
  $\widehat{A_{33}}$

Interchange Rows in Second and Third Block Rows
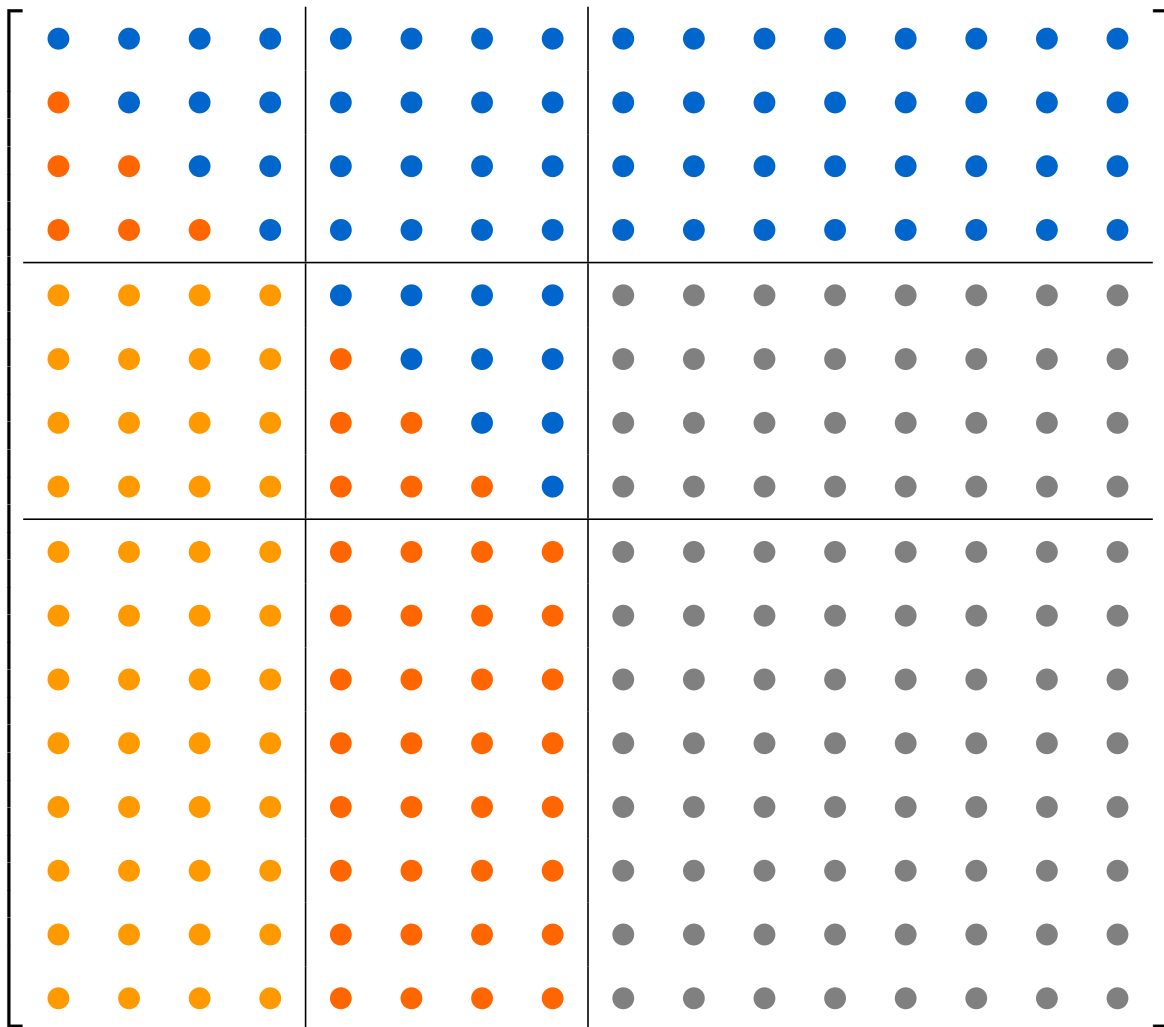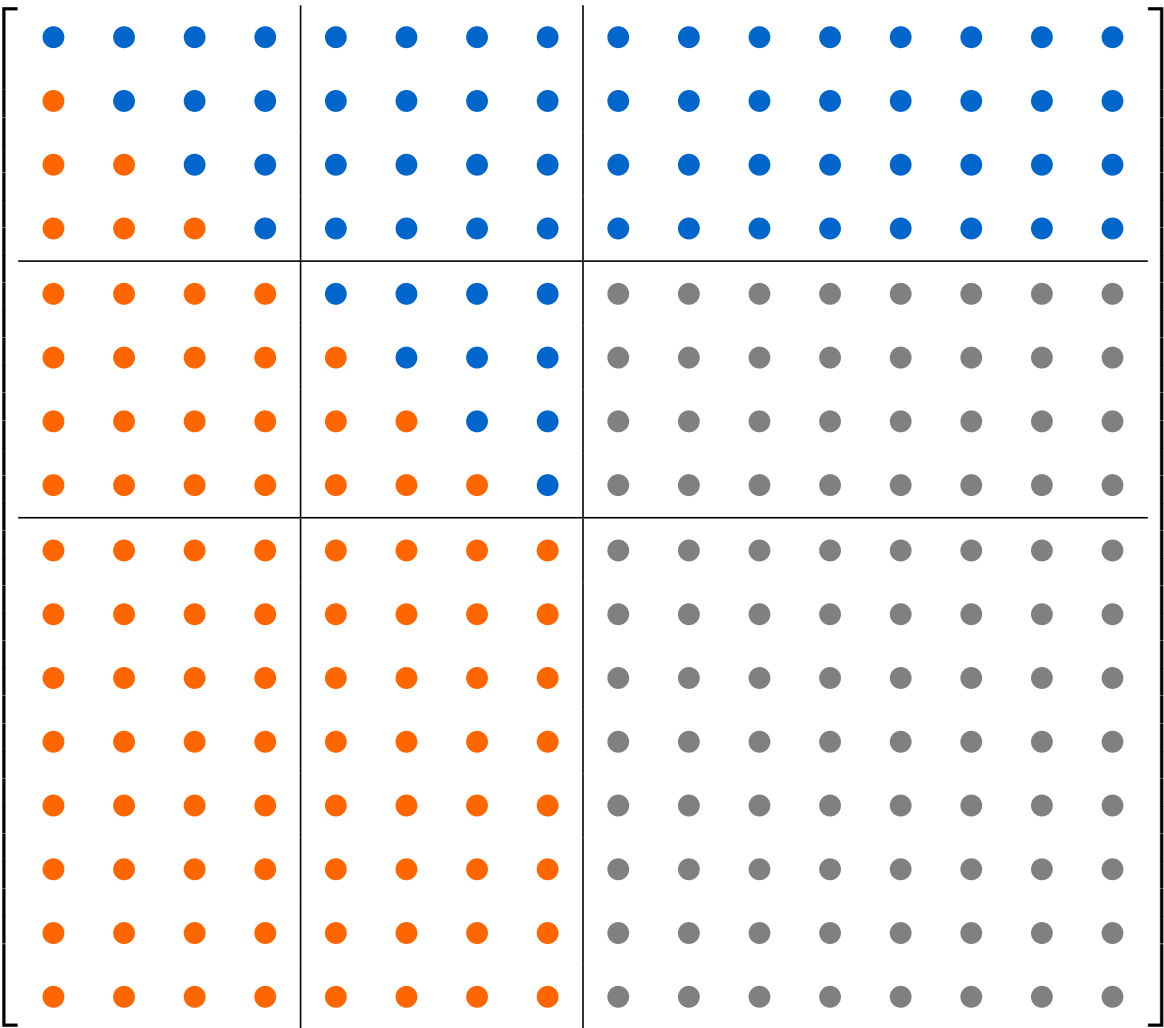
How to Move the Block Step Forward?

$$\left[\begin{array}{c|c|c} I & 0 & 0 \\ \hline 0 & A_{22} & A_{23} \\ \hline 0 & A_{32} & A_{33} \end{array}\right] = \left[\begin{array}{c|c|c} I & 0 & 0 \\ \hline 0 & L_{22} & 0 \\ \hline 0 & L_{32} & I \end{array}\right]\left[\begin{array}{c|c|c} I & 0 & 0 \\ \hline 0 & U_{22} & U_{23} \\ \hline 0 & 0 & X \end{array}\right]$$

$$\Downarrow$$

$$L_{22}U_{22} = A_{22},$$
$$L_{22}U_{23} = A_{23} \Rightarrow \textcolor{red}{U_{23} = L_{22}^{-1}A_{23}}$$
$$L_{32}U_{22} = A_{32}$$
$$L_{32}U_{23} + X = A_{33} \Rightarrow \textcolor{red}{X = A_{33} - L_{32}U_{23}}$$

- **Need to solve $L_{22}U_{23} = A_{23}$ (PDTRSM)**

- **Need to compute Schur complement $A_{33} - L_{32}U_{23}$ (PDGEMM)**

After Solve and Rank b Outer Product