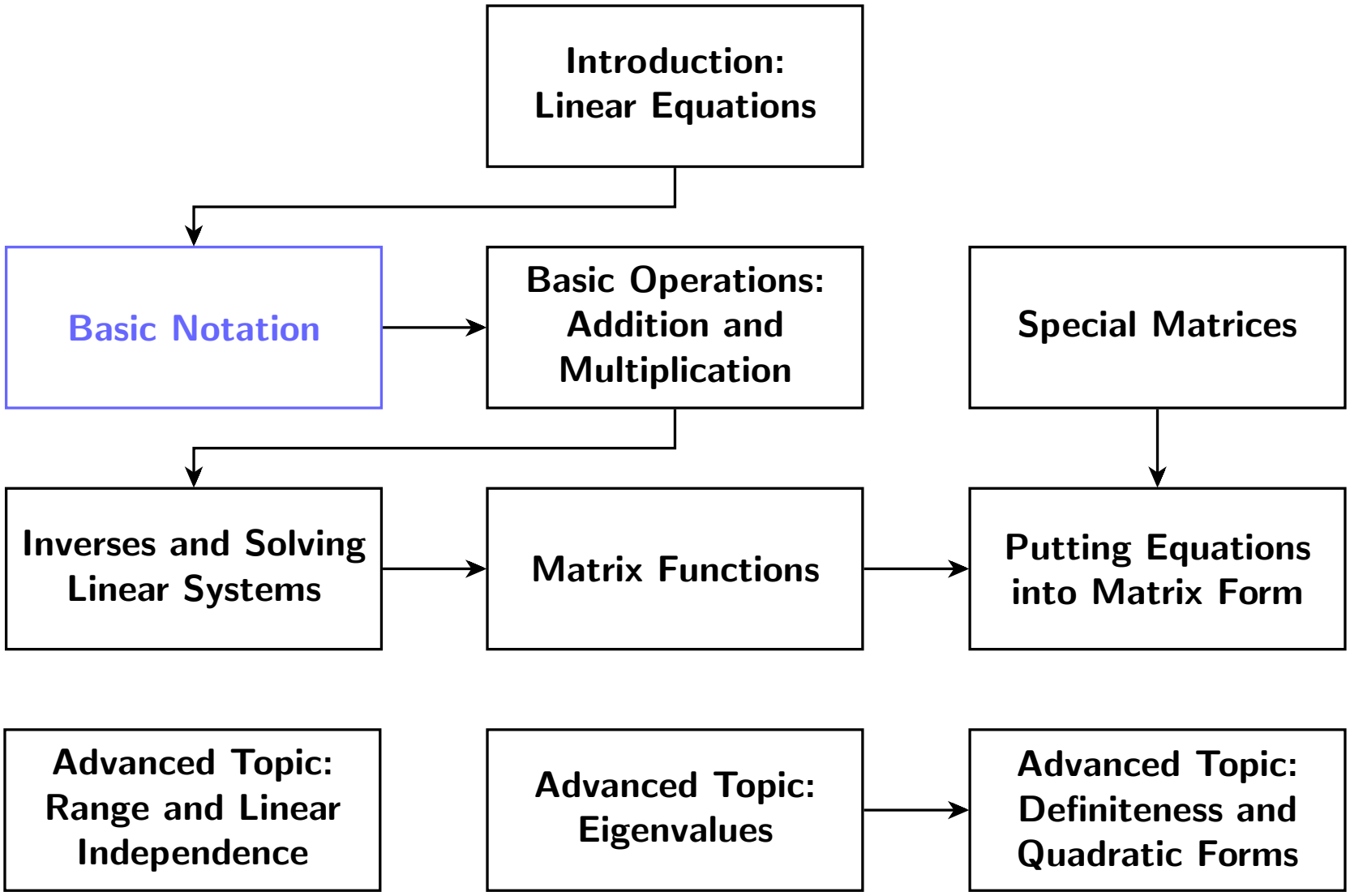
Linear Algebra Review



Basic notation

- A matrix with real-valued entries, m rows, and n columns

$$A \in \mathbb{R}^{m \times n}$$

- A_{ij} denotes the entry in the ith row and jth column

- A (column) vector with n real-valued entries

$$x \in \mathbb{R}^n$$

- x_i denotes the ith entry

The Transpose

- The transpose operator A^T switches rows and columns of a matrix

$$A_{ij} = (A^T)_{ji}$$

- For a vector $x \in \mathbb{R}^n$, $x^T \in \mathbb{R}^{1 \times n}$ would represent a row vector

Elements of a Matrix

- Can write a matrix in terms of its columns

$$A = \begin{bmatrix} | & | & & | \\ a_1 & a_2 & \cdots & a_n \\ | & | & & | \end{bmatrix}$$

- Careful, a_i here corresponds to an entire *vector* $a_i \in \mathbb{R}^m$, not an element of a vector

- Similarly, can write a matrix in terms of rows

$$A = \begin{bmatrix} - & a_1^T & - \\ - & a_2^T & - \\ & \vdots & \\ - & a_m^T & - \end{bmatrix}$$

- $a_1 \in \mathbb{R}^n$ here and $a_1 \in \mathbb{R}^m$ from previous slide are *not* the same vector