Appendix A
Notation

Scalars, Vectors, and Matrices

Scalars Scalars are denoted by plain (not boldface) characters, such as x, a, i, μ.

Vectors Vectors are denoted by boldface characters, so, for example, $\mathbf{x} = (x_1, x_2, \ldots, x_n)$.

Matrices Matrices are denoted by boldface uppercase characters, such as $\mathbf{A} = [a_{ij}]$ where a_{ij} denotes the element in the i^{th} row and j^{th} column of $\mathbf{A}$. The i^{th} row of a matrix $\mathbf{A}$ is denoted $\mathbf{A}^i$, and the j^{th} column is denoted $\mathbf{A}_j$.

Inner products The inner product of two vectors $\mathbf{x}$ and $\mathbf{y}$ is denoted $\mathbf{x}^\top\mathbf{y}$ and is defined by

$$\mathbf{x}^\top\mathbf{y} = \sum_{i=1}^{n} x_i y_i.$$

The inner product of a matrix $\mathbf{A}$ and a vector $\mathbf{x}$ is denoted $\mathbf{A}^\top\mathbf{x}$ and is defined as the vector

$$\mathbf{A}^\top\mathbf{x} = (\mathbf{A}^{1\top}\mathbf{x}, \mathbf{A}^{2\top}\mathbf{x}, \ldots, \mathbf{A}^{n\top}\mathbf{x}).$$

The following is a list of variables along with a description of their typical meanings throughout the text.

Roman Variables

$\mathbf{A}$ Incidence matrix for a network model $\mathbf{A} = [a_{ij}]$, where $a_{ij} = 1$ if resource i is used by product j and $a_{ij} = 0$ otherwise; m rows, n columns.

$\mathbf{A}^i$ The i^{th} row of the incidence matrix $\mathbf{A}$.

A^i The set of products that use resource i.

$\mathbf{A}_j$ The j^{th} column of the incidence matrix $\mathbf{A}$. Also used to denote the set of resources used by product j.

A_j The set of resources used by product j.

$B_j(y, D)$ The j^{th} "fill event."

b_j Booking limit or nested booking limit.