

Problem Set 1

Due: Tuesday, September 16, 2014

Readings: Chapter 1 of [BT] (the text will be referred to as [BT]).

Problem 1

Let \mathbf{A} be an $m \times n$ matrix. \mathbf{A}_j denotes the j th column (i.e., $\mathbf{A}_j = (a_{1j}, \dots, a_{mj})$) and \mathbf{a}_i denotes the i th row (i.e., $\mathbf{a}_i = (a_{i1}, \dots, a_{in})$). Both \mathbf{A}_j and \mathbf{a}_i are defined to be column vectors (we follow the notation of [BT] where all vectors are assumed to be column vectors; see the footnote in page 2 of [BT]). Let also $\mathbf{x} \in \mathbb{R}^n$. Convince yourselves that

$$\mathbf{Ax} = \sum_{i=1}^n \mathbf{A}_i x_i,$$

and

$$\mathbf{Ax} = \begin{bmatrix} \mathbf{a}'_1 \mathbf{x} \\ \vdots \\ \mathbf{a}'_m \mathbf{x} \end{bmatrix}.$$

Problem 2: Exercise 1.3 of [BT]

Problem 3: Exercise 1.5 of [BT]

Problem 4: Exercise 1.9 of [BT]

Problem 5: Exercise 1.13 of [BT]

Problem 6: Exercise 1.17 of [BT]

Problem 7: Exercise 1.18 of [BT]