1159-13-145 **Hema Srinivasan*** (srinivasanh@missouri.edu), Department of Mathematics, University of Missouri, Columbia, MO 65211, and **Papri Dey** (pdbdn@missouri.edu), Department of Mathematics, University of Missouri, Columbia, MO 65211. *Principal Matrices of Numerical Semigroups.* Preliminary report.

Let $\mathbf{a} = (\mathbf{a_1}, \ldots, \mathbf{a_n})$ be a set of relatively prime positive integers minimally generating the numerical semigroup $< \mathbf{a} >$ For every $1 \leq i \leq n$, there is a smallest positive integer c_i such that $c_i a_i = \sum_{j \neq i} a_{ij} a_i$. Thus, there is an $n \times n$ matrix $D(\mathbf{a}) = (\mathbf{a_{ij}})_{\mathbf{n \times n}}$ where the diagonal entries are $-c_i$. This is called a principal matrix of $D(\mathbf{a})$. Although $D(\mathbf{a})$ is not unique, certainly the diagonal entries of $D(\mathbf{a})$ are uniquely determined. The rank of $D(\mathbf{a}) \leq \mathbf{n-1}$. When the rank of $D(\mathbf{a})$ is n-1, we can recover $\mathbf{a}$ from it. We discuss the problem of characterizing the numerical semigroup when the rank is less than $n-1$. In particular, we prove that the rank of $D(\mathbf{a}) \geq \mathbf{n/2}$. This problem is intricate even when $n = 4$; we prove that when $n = 4$, the principal matrix will have rank 3 if it is not a gluing of two smaller numerical semigroups. We give examples to show that the converse is not true and why. (Received August 03, 2020)