

MATH 31A Extra Credit 1 (due Wednesday, 21 October 2009)

1. Develop a theory and an algorithm (method) for rounding off sets of real numbers subject to constraints. A typical example is a doubly stochastic matrix, the entries in each column and row of which must sum to 1.

To begin, you might consider the case when there is only a single constraint, *e.g.*, a set of real numbers that must sum to 1.

Your algorithm should be specified precisely enough that you could code it as a computer program; in fact, you might want to do that. You should also consider how long your algorithm takes as a function of the size of the set and the number of constraints (*e.g.*, as a function of n if it is an $n \times n$ matrix).

Find an example of a set of constraints that cannot always be simultaneously satisfied by rounding each real number to either the next highest or the next lowest digit in the least significant place being retained.