Stat 8801 Case Study 5: Lead
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Recap of Situation: In this case, the client wants to study whether the lead in soil is from gasoline additive (auto exhausts) or house paint chips. They are interested in sampling from a neighborhood (e.g. the above map).

Possible Issues with Study: First of all, we are not sure if there is a direct way of distinguishing lead from auto exhausts and lead from paint chips. If there are some chemical methods to do this, this study could be much easier. Otherwise, we are worried about some confounding variables, such as wind, rain fall, trees (that might absorb gas exhausts) and so on. Effects of these variables should be taken into account. Also, how many measurements are needed to reduce the measurement error to a considerably small amount?

Questions for Client: There are several questions that we would like to ask. We would like to know if there are some previous study on this or similar studies done by others. Since both the uses of lead were tailed off starting 1970s, we are interested in the history of this neighborhood. A map of 1970s or earlier would be helpful.

Sampling from the neighborhood: In the map, we see three major roads, MN-100, Minnetonka Blvd and Louisiana Ave. S. Sampling from the area near this three road would reflect the lead from auto exhausts. Also, houses in this neighborhood are mostly older than 1970s, so sampling around these buildings could tell some story about paint chips. A simple test could be used for comparison. Spatial analysis could be used if we are able to sample all over this area. Sampling methods should also depend on the client's budgets.