Problem 2.1: Star plot: Answers will vary greatly. From the star plot, the similarity of cities like Canton, OH and Cleveland, OH is apparent. Birmingham, AL and New Orleans, LA, both have quite high Nonwhite populations and Mortality rates. Portland, OR and Seattle, WA have similar stars, with high values for rainfall and education and low values for the pollution variables.

Chernoff Faces:

Key: [1.] "Rainfall" "Face height"

[2.] "Education" "Face width"

[3.] "Popden" "Face shape"

[4.] "Nonwhite" "Mouth height"

[5.] "NOX" "Mouth width"
[6.] "SO2" "Smile curve"

[7.] "Mortality" "Eyes height"

Similar things can be seen from the Chernoff faces. One interesting thing is the wide mouth of Los Angeles, indicating a high NOX level. Denver, CO and Minneapolis, MN have wide faces, indicating high education levels. York, PA and Reading, PA, have lower education levels, as evidenced by the narrow faces.

Problem 2.2. From the scatterplot matrix below, we see that SO2 and Mortality seem strongly positively associated. Nonwhite population and Mortality also have a strong positive association. Education seems somewhat negatively associated with both Rainfall and Mortality. NOX doesn’t seem to be strongly associated with any variables, but there do seem to be some cities that have high outlying values of NOX.
Problem 2.6:

# ONLY GIVE A FEW OF THESE! Give general comments based on what you see.

Below are just a few chiplots as examples: From the following chiplots, we see that SO2 and mortality are positively associated (since many dots fall above the central region in the chiplot). Nonwhite percentage and NOX are close to independent, since most points fall within the central region. And education and rainfall seem negatively associated, since most points fall below the central region.
EXTRA PROBLEM 1: We see that Education and Mortality do not seem to be independent, based on the acute angle of the axes. In fact, they seem negatively associated: cities with higher mortality rates tend to have lower education rates, and vice versa. One outlier is apparent, a city with relatively low mortality rate and education rate. That city is revealed to be Lancaster, PA (York, PA is another near-outlier).
Extra problem 2: The bubble plots below (one with abbreviated city names as labels and the other with simple dots) show again that Education and Mortality are negatively associated. In addition, we get some information about their relationship with population density. It appears that many of the most densely populated cities are around the medium levels for education and mortality. However, the most densely populated city (York, PA) has low education rate and medium-low mortality rate.