Problem #1

a)

**SAS Program**

```
libname mylib "U:\Documents\Classwork\stat479\F14\Data";

title "Scatterplot of Fuel Consumption vs Miles of Highways";
proc sgplot data=mylib.fueldat;
   scatter x=NumLic y=Fuel/datalabel=St markerattrs=(color=darkmagenta size= 6 px symbol=circlefilled);
run;
ods html close;
```

b)

**SAS Program**

```
libname mylib "U:\Documents\Classwork\stat479\F14\Data";

title "Histogram of Income (in thousands of dollars)";
proc sgplot data=mylib.fueldat;
   histogram Roads/binstart=1 binwidth=4 scale=count fillattrs=(color=cadetblue);
   density Roads/type=normal;
run;
```
c) **SAS Program**

libname mylib "U:\Documents\Classwork\stat479\F14\Data";

title "Regression Fit of Fuel Usage on Number of Licensed Drivers";
proc sgplot data=mylib.fueldat;
  reg x=NumLic y=Fuel/CLM CLI;
run;

Output
d) SAS Program

libname mylib "U:\Documents\Classwork\stat479\F14\Data\";

title "Scatter Plot Matrix of Variables Related to Fuel Use ";
proc sgscatter data=mylib.fueldat;
  matrix Fuel Roads Pop Numlic/group=TaxGrp;
run;

Output

![Scatter Plot Matrix of Variables Related to Fuel Use](image)

e) SAS Program

libname mylib "U:\Documents\Classwork\stat479\F14\Data\";

title "Dot Plot of Miles of Roads by State";
proc sgplot data=mylib.fueldat;
  dot State/response=Roads categoryorder=respasc;
run;
Problem #2

SAS Program

data starch;
input FilmType $ @;
do i=1 to 7;
input Thickness @;
output;
end;
datalines;
Wheat 5.0 3.5 4.7 4.3 3.8 3.0 4.2
Rice 7.1 6.7 5.6 8.1 8.7 8.3 8.4
Canna 7.7 6.3 8.8 11.8 12.4 12.0 11.4
Corn 8.0 7.3 7.2 6.1 6.4 6.4 6.9
Potato 13.0 13.3 10.7 12.2 11.6 9.7 10.8
Taro 7.0 6.0 7.1 5.3 6.2 5.8 6.6
;
title "Boxplots of Thickness by Film Type";
proc sgplot data=starch;
   vbox Thickness/category=FilmType datalabel;
   label Thickness ="Starch Film Thickness (in mil.)"
   FilmType ="Starch Film Type";
run;
ods html close;
Discussion

a) The six boxplots indicate that the film thickness distributions have different locations, spreads and shapes for each film type. In general, they all appear to be slightly left-skewed with longer left tails. The mean is to the left side of the median for all six distributions.

b) Obviously, the median film thickness (or the means, as well) are different for each film type potato films with the largest thickness and wheat films, the smallest. Some of these locations estimates does appear to be significantly different from each other.

c) Clearly, most distributions appear to be skewed to various degrees and may not satisfy the normality assumption. Also the spread (as measured by IQR) are different for all six distributions, and this may indicates non-homogeneous variance. The IQR does not appear to uniformly increase or decrease with with the median level of thickness, thus there is no evidence to show that the variance is a function of the mean. Some type of transformation (e.g., such as square root or logarithmic transformation) may be necessary to normalize the data before using standard analysis of variance methods.
Problem #3

SAS Program

libname mylib "U:\Documents\Classwork\stat479\F14\Data";

proc format;
  value rf 1='Fast'
           2='Moderate'
           3='Low' ;
  value xf 1='Low'
           2='Medium'
           3='High' ;
run;

title "Horizontal Barchart of Aerobic Points by Oxygen Uptake Rate";
proc sgplot data=mylib.fitness;
  hbar OxyGrp/response=Aero stat=mean group=RunGrp;
  keylegend /title='Run Time' location=inside position=topright;
  yaxis offsetmin=.2;
  format RunGrp rf. OxyGrp xf.;
run;

Output
Problem #4

SAS Program

libname mylib "U:\Documents\Classwork\stat479\F14\Data";

proc format;
  value wf 1='< 140 lbs'
    2='140-165 lbs'
    3='> 165 lbs';
  value $af 'A'='<25 yrs'
    'B'='25 to 45 yrs'
    'C'='> 45 yrs';
run;

title "Vertical Barcharts of Run Time by Oxygen Uptake";
proc sgpanel data=mylib.fitness;
  panelby WtGrp/rows=1;
  vbar AgeGrp/response=BMI stat=mean;
  format AgeGrp $af. WtGrp wf.;
run;

Output

![Vertical Barcharts of Run Time by Oxygen Uptake](image-url)