1. Write a SAS MACRO called HYPO_TEST that performs a one sample hypothesis test. It should read in a data set, a variable (say X), hypothized value (say MU), and a significance level (say ALPHA), and type of alternate hypothesis (<, >, ne). It should use the usual t-test. It should first test whether the data is normal (using PROC UNIVARIATE NORMAL) Use Shapiro-wilks. It should issue a warning if the data is not normal. The MACRO should print the data set name, variable name, mean, std, n, alpha, p-value, whether the data is normal, what test was tested, what test was used, and whether to reject or not reject the null hypothesis. For example, it might print:

   For the variable X on the data set XXX
   MEAN is XX.X  STD is XX.X
   NUMBER is XX
   ALPHA is .XX  P-VALUE .XXX

   H0: mu=XX vs H1: mu ne XX

   The DATA is NOT approximately normal, interpret results with caution

   Using the usual t-test
   DO NOT REJECT H0:
   There is not enough evidence to reject H0.

   In order to test your macro:
   Generate a random sample of 30 from a normal distribution with mean=10 and std=2. Use you macro to perform a 2-sided test H0: mu=12 vs H1: mu ne 12, with alpha=.01. Use you macro to perform a 1-sided test H0: mu=12 vs H1: mu < 12, with alpha=.05. Be sure to print the results of your 2 macro runs.

2. Write a SAS MACRO program to divide a continuous variable into K equally spaced categories. Your MACRO should
   i) read in a data set, a variable, and the number of categories
   ii) compute the high and low values of the variable, and the width, for example, if k=4 and high=60 and low=20 then width=(60-20)/4=10
   iii) compute a variable whose value is the category the observations belongs in
   iv) print the number of observations in each category
   v) make a nice histogram of the resulting counts (with nice title etc)

   SHOW how to apply the MACRO to a random sample of size 200 from a Poisson distribution with mean 30. Make six equally spaced categories.