Lab Nr. 12, Probability and Statistics

Hypothesis and Significance Tests For Comparing Two Populations

Write MATLAB routines that perform a left-, right- or two-tailed test for the following:
- the difference of two population means, when the population variances are assumed to be equal;
- the difference of two population means, when the population variances are assumed to be different;
- the ratio of two population variances.

For all these problems, find the rejection region, the value of the test statistic and the P-value of the test. (Include (many!!) comments to make it clear what H_0 and H_1 are and also to interpret your results in words).

Application

It is thought that the gas mileage obtained by a particular model of automobile will be higher if unleaded premium gasoline is used in the vehicle rather than regular unleaded gasoline. To gather evidence in this matter, 10 cars are randomly selected from the assembly line and tested using a specified brand of premium gasoline; 10 others are randomly selected and tested using the brand's regular gasoline. Tests are conducted under identical controlled conditions and gas mileages for both types of gas are assumed independent and (approximately) normally distributed. These data result:

Premium		**Regular**	
22.4	21.7	17.7	14.8
24.5	23.4	19.6	19.6
21.6	23.3	12.1	14.8
22.4	21.6	15.4	12.6
24.8	20.0	14.0	12.2

(the data from Lab nr. 10).
a. At the 5% significance level, is there evidence that the variances of the two populations are equal?
b. Based on the result in part **a.**, at the same significance level, does gas mileage seem to be higher, on average, when premium gasoline is used?