1. A cross-over trial investigated whether eating oat bran lowered serum cholesterol levels. Fourteen (14) individuals were randomly assigned a diet that included either oat bran or corn flakes. After two weeks on the initial diet, serum cholesterol was measured and the participants were then "crossed-over" to the alternate diet. After two-weeks on the second diet, cholesterol levels were once again recorded. Data appear below. The variable CORNFLK in the table represents cholesterol level (mmol/L) of the participant on the corn flake diet. The variable OATBRAN represents the participant's cholesterol on the oat bran diet. Use a 5% significance level.

ID	CORNFLK (mmol/L)	OATBRAN (mmol/L)
1	4.61	3.84
2	6.42	5.57
3	5.40	5.85
4	4.54	4.80
5	3.98	3.68
6	3.82	2.96
7	5.01	4.41
8	4.34	3.72
9	3.80	3.49
10	4.56	3.84
11	5.35	5.26
12	3.89	3.73
13	2.25	1.84
14	4.24	4.14

   a. Show the hypothesis on your output! Find the statistics test and statistics distribution table. Show the conclusion based on those.
   b. Find the P-value and make a conclusion based on the value.

2. The following table summarizes data from n=3,799 participants who attended the fifth examination of the Offspring in the Framingham Heart Study. The outcome of interest is prevalent CVD and we want to test whether the prevalence of CVD is significantly higher in smokers as compared to non-smokers. Use a 5% significance level.

	Free of CVD	History of CVD	Total
Non-Smoker	2,757	298	3,055
Current Smoker	663	81	744
Total	3,420	379	3,799

   a. Show the hypothesis on your output! Find the statistics test and statistics distribution table. Show the conclusion based on those.
   b. Find the P-value and make a conclusion based on the value.

3. A grassroots group opposed to a proposed increase in the gas tax claimed that the increase would hurt working-class people the most, since they commute the farthest to work. Suppose that the group randomly surveyed 24 individuals and asked them their daily one-way commuting mileage. The results are as follows.

Working-class	Professional (middle incomes)	Professional (wealthy)
17.8	16.5	8.5
26.7	17.4	6.3
49.4	22	4.6
9.4	7.4	12.6
65.4	9.4	11
47.1	2.1	28.6
19.5	6.4	15.4
51.2	13.9	9.3

Determine whether or not the variance in mileage driven is statistically the same among the working class and professional (middle income) groups. Use a 5% significance level.

a. Show the hypothesis on your output! Find the statistics test and statistics distribution table. Show the conclusion based on those.
b. Find the P-value and make a conclusion based on the value.

4. An engineer at an aluminium castings plant assesses the relationship between the hydrogen content and the porosity of aluminium alloy castings. The engineer collects a random sample of 14 castings and measures the following properties of each casting: hydrogen content, porosity, and strength. Show the covariance matrix!

Hydrogen	Porosity	Strength
0.1800	0.3300	0.8393
0.2100	0.4100	1.1225
0.2100	0.4500	1.1131
0.2100	0.5500	1.1000
0.2200	0.4400	0.7071
0.2200	0.2400	0.4975
0.2300	0.4700	0.5300
0.2300	0.7000	0.5206
0.2400	0.8000	0.1929
0.2400	0.2200	0.5400
0.2500	0.8800	0.3909
0.2600	0.7200	0.4200
0.2700	0.7500	0.1835
0.2800	0.7000	0.2400