

**Probability and Statistics for Psychology
and Quantitative Methods for Human Sciences
Problem Sheet 3 (HT 10): Comparing distributions**

1. Suppose we have designed a new cognitive test, and we wish to determine whether men and women perform equally well on average. We recruit 100 men and 50 women, obtaining the following results:

	Men	Women
mean	105	110
SD	20	25

- (a) Compute a 95% confidence interval for the difference between the male and female means.
- (b) Perform a significance test for the null hypothesis $\mu_{male} = \mu_{female}$ against the two-tailed alternative $\mu_{male} \neq \mu_{female}$, at the 0.05 level.
- (c) Your subjects were probably not a random sample from the general population. How does this affect the interpretation of your results?
2. To determine the effectiveness of a new drug on the level of haemoglobin in the blood of anemic patients, 10 randomly selected patients who underwent this treatment were sampled. The table below shows the level of haemoglobin in the patients blood before and after the treatment.

Patient	1	2	3	4	5	6	7	8	9	10
Before	11.2	9.4	9.9	9.3	8.9	8.2	10.5	8.8	10.3	9.8
After	12.9	10.8	10.3	10.9	8.5	8.9	10.4	8.5	11.2	10.1

Carry out both the two-sample t test and the paired sample t test at a significance level of 0.05 to determine if the drug is effective in increasing the level of haemoglobin in the blood. Given the setting of the experiment, which test is more appropriate? Why?

3. In Example 2.1 we described the Anturane Reinfarction Trial, which found a modest gain in survival when heart attack patients were given the drug anturane. Here are the data:

	Treatment (anturane)	Control (placebo)
# patients	813	816
deaths	74	89
% mortality	9.1%	10.9%

Is the difference between the treatment and the control statistically significant? Perform an appropriate test at the 0.05 significance level. What should one conclude?