1) The heat evolved in calories per gram of a cement mixture is normally distributed with standard deviation 2. We wish to test the hypothesis that the mean $\mu = 100$ against the alternative $\mu \neq 100$.
    i) If the rejection region is defined as $(-\infty,98.5]\cup[101.5,\infty]$, find the type I error probability.
    ii) Find the type II probability when the true mean heat evolved is 103.

2) The life in hours of a 75-watt light bulb is normally distributed with standard deviation 25 hours. A random sample of 20 bulbs has a mean life of 1014 hours.
    i) At the 5% significance level, is there evidence to support the claim that bulb life exceeds 1000 hours? Write down appropriate hypotheses; show the rejection region the decision rule, and your conclusion.
    ii) What is the p-value for the test?
    iii) What is the smallest level of significance at which you would be willing to reject the null hypothesis?

3) An impact test was performed on 20 specimens of PVC pipe. The standard for this material requires that impact strength must be greater than 1.0ft-lb/in. The sample average and standard deviation obtained were 1.25 and 0.25 respectively.
    i) Test the hypothesis that the true mean exceeds 1.0 ft-lb/in using $\alpha = 0.01$, and draw conclusions.
    ii) What is the p-value for the test?

4) The wall thickness of 40 glass 2-liter bottles was measured by a quality control engineer. The sample mean and standard deviation were 4.05mm, and 0.08 mm respectively. Suppose it is important to demonstrate that the wall thickness exceeds 4.0mm.
    i) Formulate and test an appropriate hypothesis. Draw conclusions at $\alpha = 0.05$.
    ii) Calculate the p-value for this test.

5) The deflection temperature under load for two different types of plastic pipe is being investigated. Two random sample of 15 pipe specimens are tested, and the deflection temperatures observed are reported below (in °F)

Type I			Type II		
206	193	192	177	176	198
188	207	210	197	185	188
205	185	194	206	200	189
187	189	178	201	197	203
194	213	205	180	192	192

i) Do the data support the claim that the deflection temperature under load for type II exceeds that of type I? Use $\alpha = 0.05$.

ii) What assumptions did you use in solving the problem.