1. A new 8-bit microcomputer chip has been developed that can be reprogrammed without removal from the microcomputer. It is claimed that a byte of memory can be programmed in less than 14 seconds.

   a) Set up the appropriate null and alternative hypotheses needed to verify this claim.
   b) What is the critical value for an $\alpha = .05$ level test based on a sample of size 15?
   c) These data are obtained on X, the time required to reprogram a byte of memory

11.6	14.7	12.9	13.3	13.2
13.1	14.2	15.1	12.5	15.3
13.3	13.4	13.0	13.8	12.3

   Test the null hypothesis. Can H_0 be rejected at the $\alpha = .05$ level? Conclude your result based on the critical value in part b).
   d) Approximate the p-value for test statistic.
   e) What happened when $\alpha = .01$ is used? Will the conclusion be the same?

2. Independent random samples were selected from populations 1 and 2. The sample sizes, means, and variances are as follows

	Population	
	1	2
Sample Size	16	13
Sample Mean	34.6	34.2
Sample Variance	4.8	4.9

   a) Suppose you wish to detect a difference between the population means. State the null and alternative hypothesis for the test
   b) Conduct a hypothesis testing to check the appropriate use of common variance between the two populations. Use $\alpha = .05$
   c) Refer to question (a), conduct a hypothesis testing to detect a difference between the population means. Use $\alpha = .05$
   d) Find the approximate *p*-value for the test then state your conclusion based on the p-value.
   e) Find a 95% confidence interval for the difference in the population means. Does the confidence interval confirm your conclusion in c)

3. We did a survey of 7 students who had passed Programming II and then we have asked for their grades in Programming I and Programming II. This is the data:
   Note: Assume that Programming II is population 1 and Programming I is population 2

Programming II	Programming I
86	78
92	90
72	66
68	70
86	85
65	53
80	83

We want to test whether there is improvement in the students' grades from Programming I to Programming II.

a) Which test would you perform in this case?

b) What is the critical value at the 5% significance level?

c) Conduct the test statistic and conclude your result based on the critical value in part b).

d) Approximate the p-value for test statistic.

4. A study is conducted to compare the variability in the number of hours that a rechargeable flashlight will operate after its battery has been fully charged. These data are obtained for two different brands of batteries:

	Brand X	Brand Y
Sample Size	25	21
Sample Variance	0.021	0.018

Use these data to test for equality of variances. Can you conclude that the variances are unequal at the $\propto= .05$ level?