Stat 401 Minitab 17 Project 3

The following instructions are for Minitab 17. The commands and menu selections for Minitab 15, Minitab 16 and Mintab Express should be similar. (If there are differences, I suggest you use the Help menu, or Internet search, to help figure things out.)

Purpose: I.a. and I.b. To use MINITAB to conduct small sample hypothesis tests for the difference between two population means.
  II. To use MINITAB to conduct a hypothesis test for paired data.
  III. To use MINITAB to conduct a hypothesis test of the difference between population proportions.

Reading: Text, Chapter 9 on Inferences Based on Two Samples.

Turn in: A. Print outs of the session windows for each of the three hypothesis tests.
  B. The answers to the questions as indicated below.

General Instructions: What follow are the Minitab commands for conducting hypothesis tests. Words in capital letters followed by the symbol > indicate a sequence of menu items to be selected/clicked.

I.a. Confidence Interval and Hypothesis Test of the Difference between Population Means – Text 9th edition homework exercise #28 (9th and 8th editions)

A. Begin by opening Minitab. Type the title "Age" in the box below C1 and type the title "Angle of" in the box below C2.
  Next, open the Excel spreadsheet file "Stat401 MINITAB 17 Project 3 data I-a".
  Highlight and copy the numbers in columns A and B, rows 1 through 15.
  In Minitab, paste the entries into columns C1 and C2.

You are going to use Minitab to conduct the hypothesis test of this text homework exercise.
We are going to assume that the assertion of a normal population distribution is justified.

STAT > BASIC STATISTICS >2-SAMPLE T…
The pull-down menu to the upper right should say "Both samples are in one column".
For the "Samples" dialog box highlight then select "C2 Angle of".
For the "Sample IDs" dialog box highlight then select "C1 Age".
Click on the "Options…" button.
Set "Confidence level:" to 90.0. [This matches the given significance level of $\alpha = 0.10$.]
Set "Hypothesized difference:" to -10.
Use the pull-down menu to select "Difference > hypothesized difference".
Click on the "OK" button in the "Options…" dialog box.
Click on the "OK" button in the "Two-Sample t for the Mean" dialog box.

B. Answer the following.
  1. State the null and alternate hypotheses. (Pay attention to which group is number 1 and which is number 2 in the Minitab analysis.)
  2. State the "older females" sample mean, "younger females" sample mean, and the calculated difference between the sample means.
  3. State the value of the hypothesis test statistic found by Minitab.
  4. State the p-value found by Minitab, and state the number of degrees of freedom used by Minitab.
  5. State whether this p-value would indicate "reject the null hypothesis" or "fail to reject the null hypothesis" at the given level of significance.
  6. State a conclusion in words, in the context of the given situation.

I.b. Confidence Interval and Hypothesis Test of the Difference between Population Means – Text 9ᵗʰ edition homework exercise #28 (9ᵗʰ and 8ᵗʰ editions) - revised

A. Either clear the previous entries in Minitab, or open a new Minitab worksheet.
   Type the title "YF" in the box below C1 and enter the 10 corresponding observations in the C1 column.
   Type the title "OF" in the box below C2 and enter the 5 corresponding observations in the C2 column.
   (The numbers should be right-justified, indicating that they are being recognized as numeric data.)

You are going to use Minitab to conduct a two-tailed hypothesis test of this text homework exercise at a significance level of 0.05, testing whether the difference between the two population means is or is not 10. You'll also construct the corresponding confidence interval.
We are going to assume that the assertion of a normal population distribution is justified.

STAT > BASIC STATISTICS >2-SAMPLE T…
From the pull-down menu select "Each sample is in its own column".
For the "Sample 1" dialog box highlight then select "C1 YF".
For the "Sample 2" dialog box highlight then select "C2 OF".
Click on the "Options…" button.
Set "Confidence level:" and "Hypothesized difference:" according to the instructions given above.
Use the pull-down menu to select a two-tailed test.
Click on the "OK" button in the "Options…" dialog box.
Click on the "OK" button in the "Two-Sample t for the Mean" dialog box.

B. Answer the following.
   1. Give the 95% confidence interval and write a verbal interpretation of its meaning.
   2. State the null and alternate hypotheses.
   3. State the "older females" sample mean, "younger females" sample mean, and the calculated difference between the sample means.
   4. State the value of the hypothesis test statistic found by Minitab.
   5. State the *p*-value found by Minitab.
   6. State whether this *p*-value would indicate "reject the null hypothesis" or "fail to reject the null hypothesis" at the given level of significance.
   7. State a conclusion in words, in the context of the given situation.
   8. In the context of this homework question, which hypothesis test would be more useful, the one-sided test of I.a. or the two-sided test of I.b.?

II. Hypothesis Test of Paired Data – Text homework exercise #40a (9ᵗʰ and 8ᵗʰ editions)

A. Either clear the previous entries in Minitab, or open a new Minitab worksheet.
   Type the title "Lactation" in the box below C1 and enter the 10 corresponding observations in the C1 column. Type the title "Postweaning" in the box below C2 and enter the 10 corresponding observations in the C2 column. (The numbers should be right-justified, indicating that they are being recognized as numeric data.)

You are going to use Minitab to conduct the hypothesis test of this text homework exercise.
We are going to assume that the assertion of normal population distributions is justified.

STAT > BASIC STATISTICS >PAIRED t…
The pull-down menu to the upper right should say "Each sample is in a column".
Designate Lactation as Sample 1 and Postweaning as Sample 2.
Click on the "Options…" button.
Read the exercise carefully to determine the correct "Confidence level:", "Hypothesized difference:" and "Alternative hypothesis:".
Click on the "OK" button in the "Options…" dialog box.
Click on the "OK" button in the "One-Sample Proportion" dialog box.

B. Answer the following.
   1. State the null and alternate hypotheses.
   2. State the "lactation" sample mean, "postweaning" sample mean, and the calculated value of $\overline{d}$.
   3. State the value of the hypothesis test statistic found by Minitab.
   4. State the p-value found by Minitab.
   5. State whether this p-value would indicate "reject the null hypothesis" or "fail to reject the null hypothesis" at the given level of significance.
   6. State a conclusion in words, in the context of the given situation.

III. Hypothesis Test of a Difference Between Population Proportions – Text homework exercise #54 (9th and 8th editions)

A. Either clear the previous entries in Minitab, or open a new Minitab worksheet.

You are going to use Minitab to conduct the hypothesis test of this text homework exercise.
We are going to assume that the assertion of normal population distributions is justified.

STAT > BASIC STATISTICS >2 PROPORTIONS…
The pull-down menu to the upper right should say "Summarized data".
Read the exercise carefully to determine the correct
   "Number of events" = observed value for random variable X for Sample 1 and Sample 2
   "Number of trials" for Sample 1 and Sample 2
Click on the "Options…" button.
Read the exercise carefully to determine the correct
   "Confidence level:",   "Hypothesized difference:",   Lower-tailed, two-tailed, or upper-tailed test.
Use the pull-down menu to select "Test method:" Use the pooled estimate of the proportion.
Click on the "OK" button in the "Options…" dialog box.
Click on the "OK" button in the "Two-Sample Proportion" dialog box.

B. Answer the following.
   1. Define random variable X in this situation, i.e. "$X = \ldots$" followed by a word description of what X is counting.
   2. Give the 90% confidence interval and write a verbal interpretation of its meaning.
   3. State the null and alternate hypotheses.
   4. State the "TC" sample proportion, "DJS" sample proportion, and the calculated difference between the sample proportions.
   5. State the value of the hypothesis test statistic found by Minitab.
   6. State the p-value found by Minitab.
   7. State whether this p-value would indicate "reject the null hypothesis" or "fail to reject the null hypothesis" at the given level of significance.
   8. State a conclusion in words, in the context of the given situation.