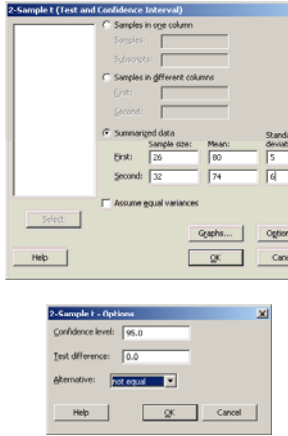




### Hypothesis Test: Minitab

- Resting pulse
  - 26 smokers had a mean of 80 beats per minute (bpm) and a standard deviation of 5 bpm.
  - 32 non-smokers, the mean and standard deviation were 74 and 6 bpm.
- Minitab > Stat > Basic > 2T
  - Could be "Samples in different columns" or "Summarized Data"
  - Decide which population you will call "First". This data goes first, and the parameter gets listed first in the final statement. I chose smokers.
  - Options
    - Enter Test difference (usually 0)
    - Alternative: Refer to  $H_A$



### Just Checking...

Two-Sample T-Test and CI

Sample	N	Mean	StDev	SE Mean
1	26	80.00	5.00	0.98
2	32	74.00	6.00	1.1

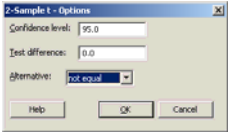
Difference =  $\mu(1) - \mu(2)$   
 Estimate for difference: 6.00  
 95% CI for difference: (3.11, 8.89)  
 T-Test of difference = 0 (vs not =): T-Value = 4.15 P-Value = 0.000 DF = 55

Annotations: "DOUBLE CHECK DATA ENTRY" points to the SE Mean values. "TEST STATISTIC" points to the T-Value. "P-VALUE" points to the P-Value. "DF" points to the Degrees of Freedom.

- Conclusion?
  - Is there evidence of a difference in mean pulse rate between smokers and nonsmokers?

### Confidence Interval

- To get a confidence interval, you only need to change
  - Confidence Level
  - Alternative: Not Equal
- We already calculated the 95% confidence interval (3.11, 8.89)
- Interpret the interval.



### Difference or No Difference? And... If difference, which is larger?

- Confidence intervals for the mean difference,  $\mu_F - \mu_M$ 
  - (0.111, 0.112)
  - (-1.89, 200.47)
  - (-2.34, -1.17)

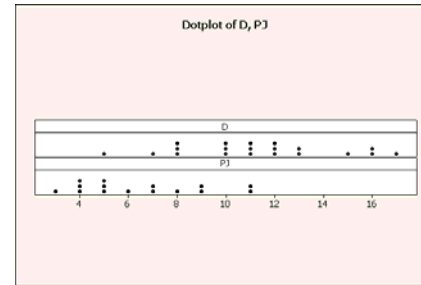
### Another Example: Pizza Fat Content

- Here is saturated fat content (in grams) for pizzas sold by two national chains.

<b>D</b>	17	12	10	8	8	10	10	5	16	16
	8	12	15	7	11	11	13	13	11	12
<b>PJ</b>	6	7	11	9	4	4	7	9	11	3
	4	5	8	5	5					

- If we want to perform inference (hypothesis tests and confidence intervals), we need to enter the data in Minitab and check the “nearly normal condition”
  - Enter D in C1; PJ in C2
  - Plot dotplots of each
    - Note: You may want to make the x bins the same under “multiple graphs”

### Just Checking



### Pizza Hypothesis Test

- Is the difference in means significant?
- Hypotheses

Model

- Find the test statistic and p-value and form conclusions...

### Just Checking... (And CI)

Two-sample T for D vs PJ

	N	Mean	StDev	SE Mean
D	20	11.25	3.19	0.71
PJ	15	6.53	2.59	0.67

Difference =  $\mu(D) - \mu(PJ)$   
 Estimate for difference: 4.717  
 95% CI for difference: (2.725, 6.709)  
 T-Test of difference = 0 (vs not =): T-Value = 4.82 P-Value = 0.000 DF = 32

DOUBLE CHECK DATA ENTRY

TEST STATISTIC

P-VALUE

DF

- Interpret the Confidence Interval...

### Project #3: COC Students and Math

- The Data - COC Students Sample
  - The dataset contains a simple random sample of 100 COC students in math classes in Fall 2008. The dataset was obtained from the COC Office of Institutional Research. Courses are limited to those under the 200-level.
  - Variables
    - grade: 4 = A, 3 = B, 2 = C, 1 = D, 0 = F or FW. Grades are the grade of record (in the college's database)
    - course: the course for which the student earned the grade
    - age: the age of the student, as reported by the student on the college application
    - gender: the gender of the student, as reported by the student on the college application
    - ethnicity: the ethnicity of the student, as reported by the student on the college application
- The Assignment/Question
  - How do these students fare in COC math courses? And how can we generalize these results to speak for all COC students in math courses below the 200-level?
- Due Date
  - In-class on the last day our class meets (no late assignments accepted, no exceptions)

### Project #3: COC Students and Math

- Things to Consider...
  - Your final write-ups should include ONLY the graphs/statistics that are relevant.
  - Suggested Discussion Points:
    - Describe the distribution (shape, center, spread, other features)
    - If it is appropriate, fit an appropriate model (Normal model, linear model).
    - If it is appropriate, conduct an appropriate hypothesis test or construct a confidence interval. Try to speculate about all COC students.
  - Provide evidence for all of your findings (with graphs/etc).
- More Details
  - Individual Activity
    - Everyone is responsible for their own unique write-up.
  - Final Write Up Max: 3 pages
    - Typed, double spaced, including graphs
    - Include graphs with the text, not at the end
- If you are not strong with writing, be sure to visit the English tutors in the TLC lab...
  - Papers should include intro (and thesis statement), body, and conclusion

### Class Work

- To get credit, it is your responsibility to get checked off.
  1. Chapter 24 Handout
    - No Solutions – (you are starting on Project #3)

### Homework

- Textbook/Routine Homework
  - Due Next Week (25% chance of collection)
    1. Read Chapter 24
    2. Pg 640-648: #1, 3, 5, 13, 15, 19, 25, 31, 35, 37
- Project #3
  - Project #3 (Individual)