USING EXCEL FOR DIFFERENCE OF MEANS TESTS

Excel will conduct a difference of means test. To do this you need to reorganize the data and make some informed decisions.

1. Cut and paste the data so that the you have two columns side-by-side with the variable for sample (Note: samples will represent each group, such as males and females; treatment versus control).

2. You can use **Tools, Data Analysis, Descriptive Statistics** to generate sufficient information to conduct a difference of means test

3. Or, you can use:

   t-test Two sample assuming equal variances - use this for small sample problems (n for each sample < 30)

   t-test Two sample assuming unequal variances - use this for large sample problems

   z-test, Two samples for means - this test is for the unique case where we know σ_1 and σ_2 for the two populations

4. Be careful which you choose, and look carefully at what they ask for in terms of filling in the information

   Variable 1 range
   Variable 2 range
   Labels in first row
   Hypothesized mean difference
   Alpha
   Output range

   For the z-test it will also ask for the variances for each group (since they are assumed known).

DESCRIPTIVE STATISTICS FOR CHOLESTEROL LEVELS OF MALES AND FEMALES

Cholesterol	*Females*	*Males*
Mean	200.31757	196.085366
Standard Error	0.8812586	0.96610995
Median	201	196
Mode	194	196
Standard Deviation	10.720974	12.372244
Sample Variance	114.93928	153.072423
Kurtosis	-0.4930988	0.01540046
Skewness	-0.1089159	0.08632739
Range	47	61
Minimum	176	166
Maximum	223	227
Sum	29647	32158
Count	148	164
Confidence Level(95.0%)	1.7415714	1.90770209

OUTPUT FROM EXCEL

Here is the results of Excel's Difference of Means Test assuming unequal variances. Excel does everything we do but uses a t value rather than a z-value for the critical region.
I used $\alpha = .05$ for this test.

t-Test: Two-Sample Assuming Unequal Variances

	Female	*Male*
Mean	200.31757	196.08537
Variance	114.93928	153.07242
Observations	148	164
Hypothesized Mean Difference	0	
df	310	
t Stat	3.2364596	
P(T<=t) one-tail	0.0006706	
t Critical one-tail	1.6497825	
P(T<=t) two-tail	0.0013411	
t Critical two-tail	1.9676463	

OUTPUT FROM SAS

SAS gives similar output but in a different form. Since it was not specified, SAS gives the results assuming equal variances and not assuming equal variances. It also gives a test on whether it is reasonable to assume that the variances are equal.

The TTEST Procedure

Statistics

Variable	GENDER	N	Lower CL Mean	**Mean**	Upper CL Mean	Lower CL Std Dev	Std Dev	Upper CL Std Dev	Std Err
CHOLEST	0	164	194.18	196.09	197.99	11.163	12.372	13.878	0.9661
CHOLEST	1	148	198.58	200.32	202.06	9.623	10.721	12.104	0.8813
CHOLEST	Diff (1-2)		-6.824	**-4.232**	-1.64	10.772	11.619	12.611	1.3173

T-Tests

Variable	Method	Variances	DF	t Value	Pr > |t|
CHOLEST	Pooled	Equal	310	-3.21	0.0015
CHOLEST	**Satterthwaite**	**Unequal**	**310**	**-3.24**	**0.0013**

Equality of Variances

Variable	Method	Num DF	Den DF	F Value	Pr > F
CHOLEST	Folded F	163	147	1.33	0.0770