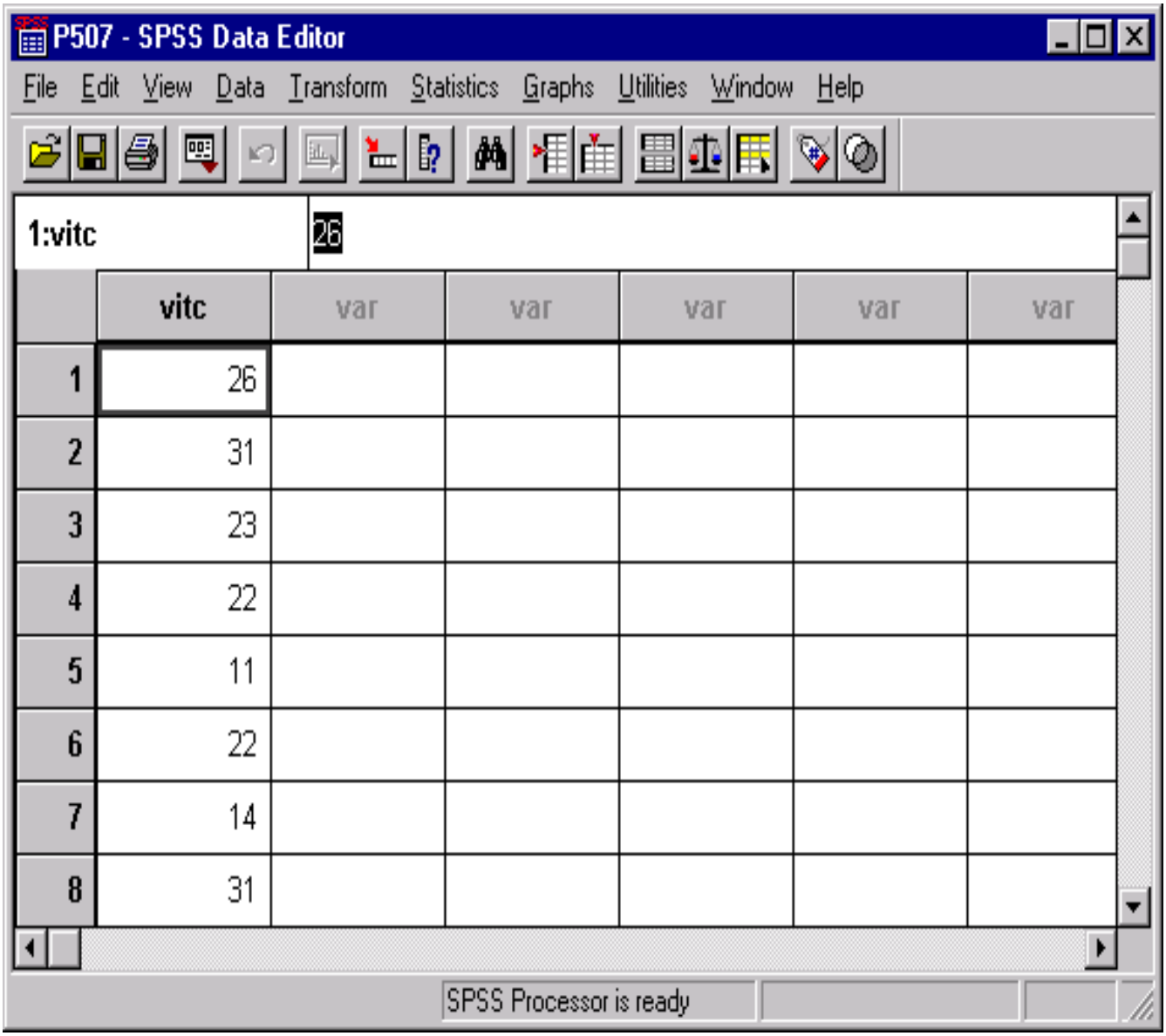
SPSS Chapter 7 Example 1 - One-Sample t Test

The U.S. Agency for International Development provides corn soy blend (CSB) for emergency relief to countries around the world. Government specifications state that CSB should contain 2 pounds of vitamin premix for every 200 pounds of product such that the final product contains 40 mg/100 g of vitamin C. Thus, we want to test

H_0: $\mu = 40$

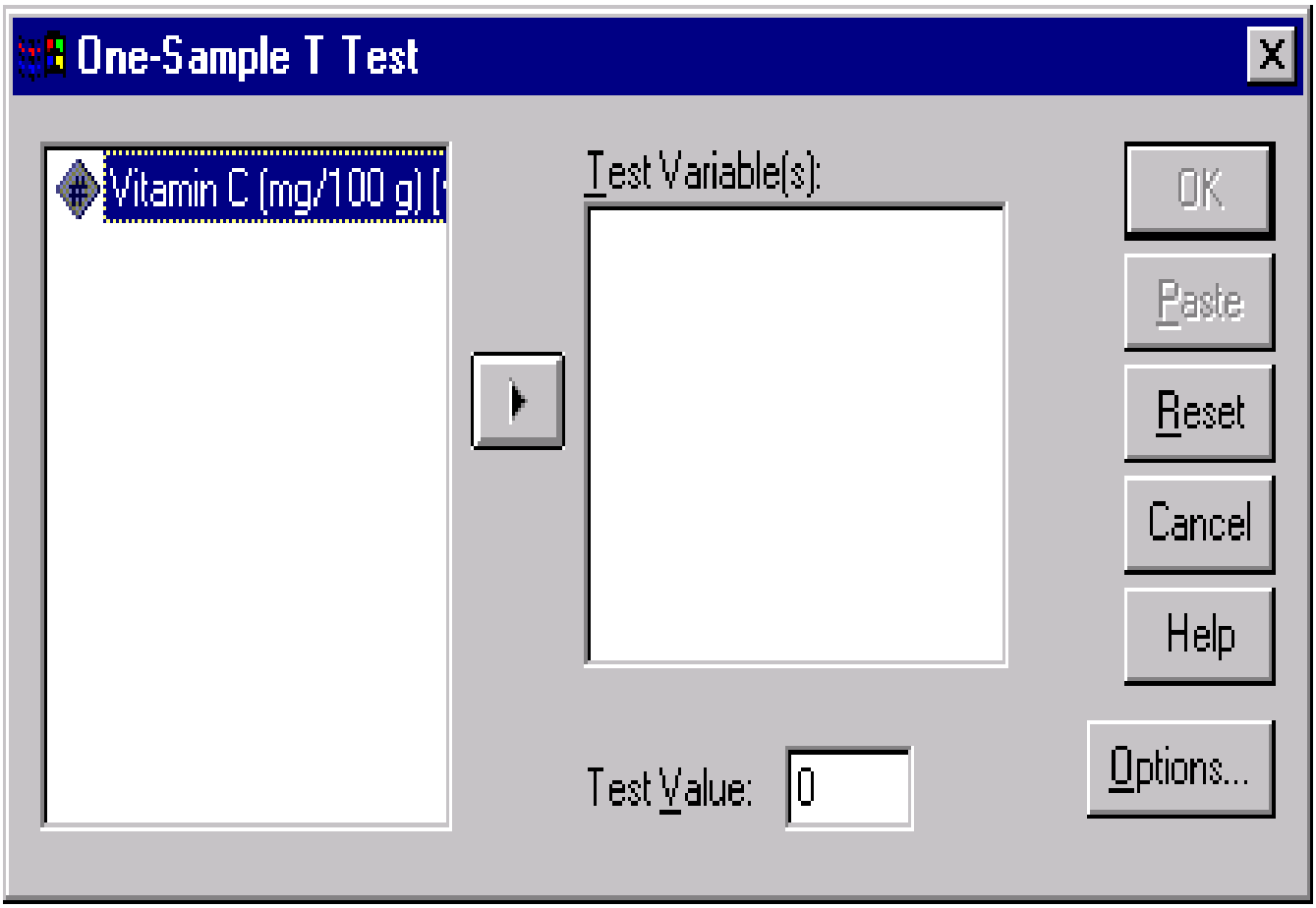
H_a: $\mu \neq 40$

The data are entered into SPSS and look like the following:



Follow these steps to perform this analysis:

1. Click **Analyze**, click **Compare Means**, and click **One-Sample t Test**. The following window will appear.



2. Click "**vitc**" (a.k.a. "**Vitamin C (mg/100 g)**") and click ▸ to move "**vitc**" into the box entitled ***Test Variable(s)***.

3. Change the value "**0**" to "**40**" in the box entitled ***Test Value*** (40 is the value of μ for the H_o).

4. A 95% confidence interval is the default for the One-Sample t Test. If you wish to change the confidence level, click **Options**, change "**95**" to the desired confidence level in the box entitled ***Confidence Interval***, and click **Continue**.

5. Click **OK**.

The SPSS output for this example of the One-Sample t Test is the following:

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Vitamin C (mg/100 g)	8	22.50	7.19	2.54

There are eight observations with a mean of 22.50.

One-Sample Test

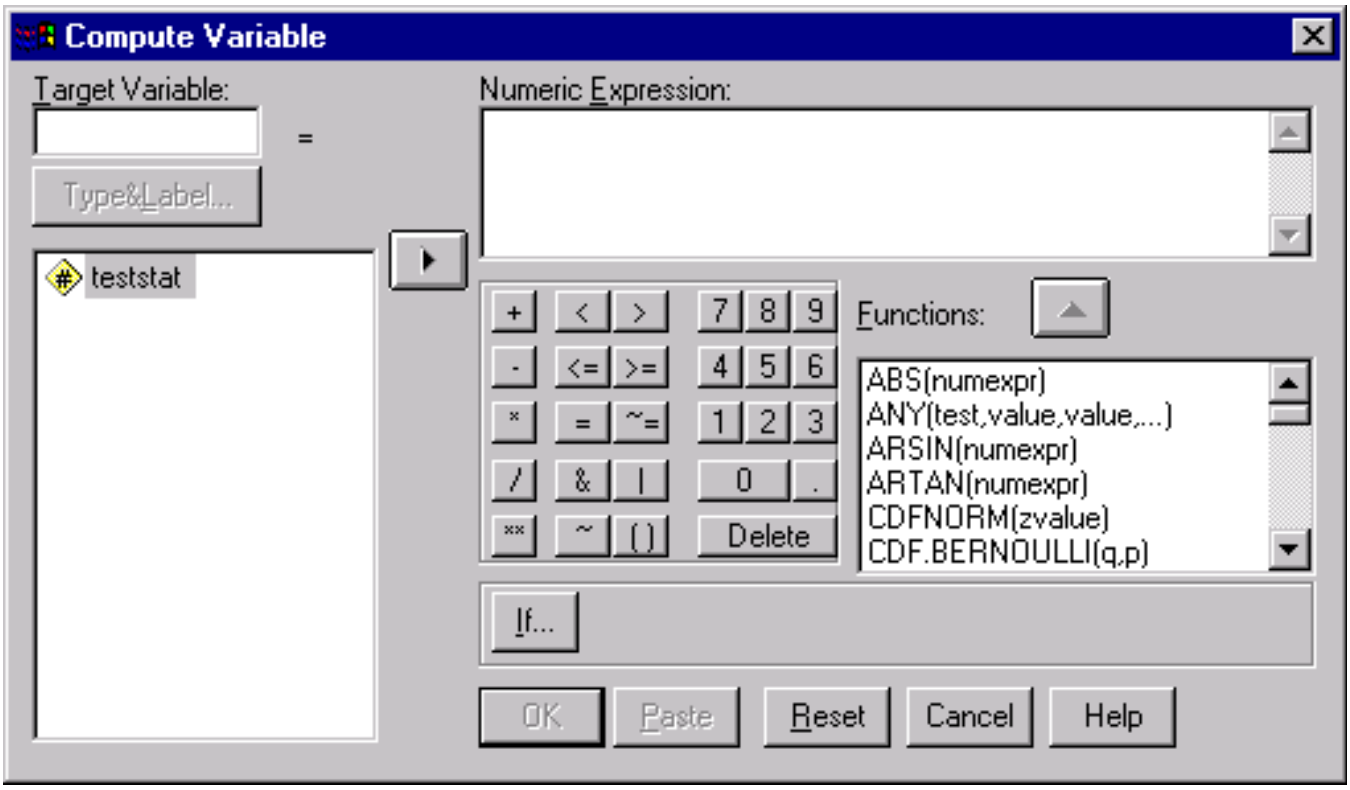
	Test Value = 40					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Vitamin C (mg/100 g)	-6.883	7	.000	-17.50	-23.51	-11.49

The One-Sample t Test tests H_0: $\mu = 40$ vs H_a: $\mu \neq 40$. The t statistic is t = 6.883 with 7 degrees of freedom. The p-value is less than .001 indicating strong evidence against H_0. We now calculate an exact p-value below.

Follow these steps to calculate the p-value:

1. Enter the value of the test statistic (i.e., -6.883) into the SPSS Data Editor using a variable called "**teststat**."

2. Click **Transform** and click **Compute**. The following window will appear.



3. Type "**pvalue**" in the box entitled ***Target Variable***.

4. In the box entitled ***Functions***, click the ▼ button until the function entitled ***CDF.T(q, df)*** appears in the box. Double click on **CDF.T(q, df)** to move this function into the box entitled ***Numeric Expression***.

   Note: The CDF.T(q, df) function stands for the cumulative distribution function for the t distribution, and it calculates the area to the left of *q* under the t distribution.

5. The CDF.T(q, df) function will appear as ***CDF.T(?, ?)*** in the ***Numeric Expression*** box. The variable "**teststat**" replaces the q, and the degrees of freedom (df) for this example are 7 (i.e., 8-1). Thus, for H_a: $\mu \neq 40$, the

Numeric Expression should appear as "**2*(1 – ABS(CDF.T(teststat, 7)))**". The 2 is there to multiply the probability by 2 since this is a two sided test.

Note: The ABS(numexpr) function stands for the Absolute Value of a numerical expression. For H_a: $\mu < 40$, the Numeric Expression should appear as "**CDF.T(teststat, 7)**". For H_a: $\mu > 40$, the Numeric Expression should appear as "**1 - CDF.T(teststat, 7)**".

6. Click **OK**.

The exact p-value necessary will appear in the SPSS Data Editor window in the variable entitled ***pvalue***: