2-SAMPLE T TEST

This test is used to compare 2 means from a between groups design

The SAT scores of 13-year olds who took the test between 1980 and 1982 are below:

Group	n	x-bar	s
Males	19,883	416	87
Females	19,937	386	74

Determine if male scores are significantly higher than female scores at the α = .01 level.

P) STATE POPULATION PARAMETERS:

μ_m = the mean SAT math score of males

μ_f = the mean SAT math score of females

H) STATE HYPOTHESES:

H_0: $\mu_m = \mu_f$ H_a: $\mu_m > \mu_f$

A) VERIFY CONDITIONS REQUIRED FOR TEST:

Normal population or large sample size or justification for normality after omitting outliers

Since $n_m > 30$ and $n_f > 30$, the Central Limit Theorem applies

T) PERFORM TEST USING

a) TABLE C:

i) Put data into lists and calculate x-bar/standard deviation (if necessary)

ii) Calculate t-statistic:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = 37.06$$

iii) Determine degrees of freedom:

Using smaller of n_1 and n_2, df = 19,883 – 1 = 19,882

iv) Locate critical t-value

Table C (df = 1000 and $\alpha = .01$), the critical t value is 2.326.
Since 37.06 > 2.326, the P-value < .01.

b) CALCULATOR:

STAT ---> TESTS ---> 4: 2-Samp T Test ---> P-value = 0

tcdf (min, max, df) = (37.06, 100, 19882) = 0

S) STATE CONCLUSION IN CONTEXT:

There is very good evidence (P-value < .01) to reject H_0 and conclude that 13-year old males scored higher on the math SAT test than 13-year old females between 1980 and 1982

CONFIDENCE INTERVAL (Use PAIS):

A 95% confidence level for the mean difference in SAT math scores between males and females can be found using:

STAT ---> TESTS ---> 0: 2-Samp T Int = (28.4, 31.6)

We are 95% confident that 13-year old males scored between 28 and 32 points higher on the SAT math test than 13-year old females between 1980 and 1982.