**1. State the Hypotheses for the Scenario**

H0: µ1 = µ2

HA: µ1 < µ2

This is a left-tailed test because we want to determine if the reduction of systolic blood pressure in the treatment group is statistically significant as compared to the control group.

**2. Critical value and test statistics**

We will use a two-sample t-test at a .01 significance level. We start with our preliminary calculations:

**Standard Error**

Compute the standard error. We use Excel using the SQRT function to get the following:

 Let s1 = 38.5, s2 = 39.8, n1 = 78, and n2 = 70

SE = sqrt[(s12/n1) + (s22/n2)]

SE = sqrt[(38.52/78) + (39.82/70]

SE = sqrt[(1482.25/78) + (1584.04/70]

SE = sqrt(19 + 22.63)

SE = 6.452

**Degrees of Freedom**

The smaller of n1 - 1 and n2 - 1 which is 69.

We then find the test statistic and crucial value.

**Test statistic**

We use the T test in a situation where the population standard deviation is not known or the sample size is small. In our scenario, we do not know the population standard deviation. As such, we compute the test statistic as follows using $α=0.01$:

We find t to be:

 t\* = [ x1 - x2 – (µ1 - µ2)] / SE

t\* = [186.7 - 201.9 - 0 ] / 6.452

t\* = -15.2 / 6.452

t\* = -2.36

**Critical Value Method**

We use the α=0.01 and the degrees of freedom at 69 using the =T.INV(.01, 69) formula to find tcritical to be:

 tcritical = -2.38

**3. Make the Decision and State Clearly**

For the left-tailed test, if t\* < tcritical, we reject H0. Since the t statistic (-2.36) > -2.38, we cannot reject the null hypothesis and, therefore:

We cannot conclude people with high blood pressure can reduce their systolic blood pressure by taking a new drug we have developed.

**4. State the Hypotheses for the Scenario**

H0: µd = 0

HA: µd > 0

This is a right-tailed test because we want to determine if for the populations of blood pressures before and after the drug, the differences have a mean greater than 0 mm Hg (so the claim is that the drug helps lower the blood pressure).

**5. P-value and test statistics**

We will use a two-sample t-test at a .01 significance level. We start with our preliminary calculations:

 **Average and Standard Deviation**

Compute the average (d) and standard deviation (sd) for the mean of the differences. Using AVERAGE and STDEV.S functions in Excel we find:

 d = 18.25

 sd = 9.54

**Test statistic**

We use the T test in a situation where the population standard deviation is not known or the sample size is small. In our scenario, we do not know the population standard deviation. As such, we compute the test statistic as follows using $α=0.05$:

Using Excel with difference in population mean from our hypothesis, µd = 0 and n = COUNT(), We find t to be:

 t\* = d - µd / [sd / SQRT (n)]

t\* ≈ 6.63

**P-Value Method**

We use the t statistic (6.63) and the degrees of freedom at 11 using the =1-T.DIST(6.63,11, TRUE) formula to find p-value to be:

 p-value = .000019

**6. Make the Decision and State Clearly**

For the right-tailed test, if p-value < α, we reject H0. Since the p-value .000019 < .05, we reject the null hypothesis and, therefore:

We can conclude that for the populations of blood pressures before and after the drug, the differences do have a mean greater than 0 mm Hg and that the drug helps lower the blood pressure.