# Procedure for Runs test of Randomness.

In this activity we review the procedure for the runs test for randomness.

The runs test for randomness is used to determine whether a sequence of sample data has a random order.

The key idea underlying the runs test is that we reject randomness if the number of runs is very low or very high.

At first glance, the flowchart might appear to be complex and intimidating, but it is actually quite simple.

The basic design of the flowchart is to guide you so that you obtain the test statistic by using one of two approaches:

1. the test statistic is just the number of runs G;
2. the test statistic is manually calculated by using three values obtained from the sample data.

Let’s begin!

First, identify a sequence of two different characteristics, such as male-female.

Count the number of elements of the first type, and denote it as n sub 1.

Then, count the number of elements of the second type and denote this value as n sub 2.

Next, count the number of runs and denote it by *G*.

Now we are ready to take one of two different approaches for finding the test statistic.

Consider the sizes of the samples.

If n sub 1 is not greater than 20,

AND n sub 2 is not greater than 20,

AND the significance level is equal to 0.05, then the test statistic is G and you can use Table A-10 to find the critical values.

Now, it is time to test your knowledge.

On the other hand, if n sub 1 is greater than 20,

OR n sub 2 is greater than 20

OR the significance level is not equal to 0.05

Then you calculate the expected mean number of runs, denoted by mu sub G, by using the expression in the flowchart.

Next, calculate the expected standard deviation for the numbers of runs by evaluating the expression in the flowchart.

The test statistic *z* equals the quantity *G* minus mu sub G divided by *sigma* sub G.

Finally determine the critical values of *z* from table A-2 as usual.

Whichever path you took, you are now ready to compare the test statistic with the critical values.

If the test statistic is less than or equal to the smaller critical value, or greater than or equal to the larger critical value, then reject randomness.

Otherwise fail to reject the null hypothesis of randomness.

Now, it is time to test your knowledge.

In this activity we reviewed the procedure for the runs test for randomness, which is used to determine whether a sequence of sample data has a random order.

Remember, the key idea underlying the runs test is that we reject randomness if the number of runs is very low or very high.

Congratulations, you have mastered an important concept of Statistics!

Without randomness, what fun would there be in the world?