Start

Identify a sequence of two different characteristics.

Determine the value of n_1, the number of elements of the first type.

Determine the value of n_2, the number of elements of the second type.

Determine the value of G, the number of runs.

Is $n_1 > 20$?

No

Yes

Is $n_2 > 20$?

No

Yes

Does $\alpha = 0.05$?

No

Yes

Calculate

$$\mu_G = \frac{2n_1 n_2}{n_1 + n_2} + 1$$

Calculate

$$\sigma_G = \sqrt{\frac{2n_1 n_2 (2n_1 n_2 - n_1 - n_2)}{(n_1 + n_2)^2 (n_1 + n_2 - 1)}}$$

Calculate the test statistic

$$z = \frac{G - \mu_G}{\sigma_G}$$

The test statistic is G. Use Table A-10 to get the critical values.

Determine the critical values of z from Table A-2 as usual. (If $\alpha = 0.05$, the critical values are −1.96 and 1.96.)

Reject randomness if the test statistic is less than or equal to the smaller critical value or greater than or equal to the larger critical value. Otherwise, fail to reject the null hypothesis of randomness.

Figure 13-6 **Procedure for Runs Test for Randomness**