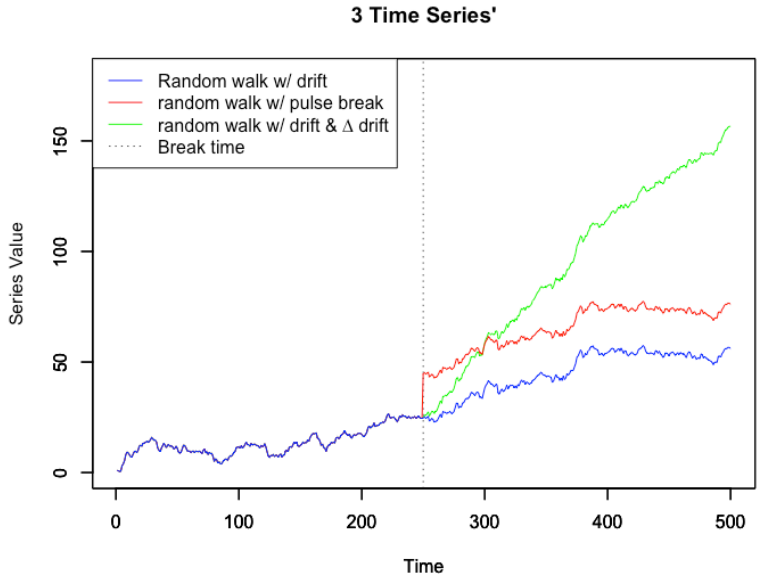
Time Series Econometrics Tutorial 7: Unit Roots with Structural Breaks and Seasonal Roots

Exercise 1:



Series	Type	Break Time
X	Random walk with drift	N/A
Y	Random walk with pulse break	t = 250
Z	Random walk with drift and sudden change in drift	t = 250

Exercise 2:

$$H_0: \text{Unit root}$$
$$H_1: \text{Trend} - \text{stationary with a structural break}$$

Series X:

Model	Test Statistic	Critical Value	Potential Break Point position
"trend"	-3.559	-4.42	75

The test-statistic is greater than the critical value, therefore we fail to reject the null. This is consistent with the visual interpretation.

H_0: Unit root
H_1: Trend stationary with a change in the intercept of the trend

Series Y:

Model	Test Statistic	Critical Value	Potential Break Point position
"intercept"	-6.1854	-4.8	249

The test statistic is less than the critical value, therefore the null hypothesis can be rejected. The rejection of the null hypothesis is consistent with the visual information above. The break point detection is consistent with the visual interpretation, because it is shown that there is a breakpoint at time 250, a mere 1 time unit difference.

H_0: Unit root
H_1: Trendstationary with a change in the drift parameter

Series Z:

Model	Test Statistic	Critical Value	Potential Break Point position
'trend'	-3.8433	-4.42	191

The test statistic is greater than the critical value, therefore we fail to reject the null hypothesis. However, this is inconsistent with the visual identification of the series, we know there is a change in the drift of the series.. The test also states an incorrect potential break point position of 191, when in fact it is a known 250.