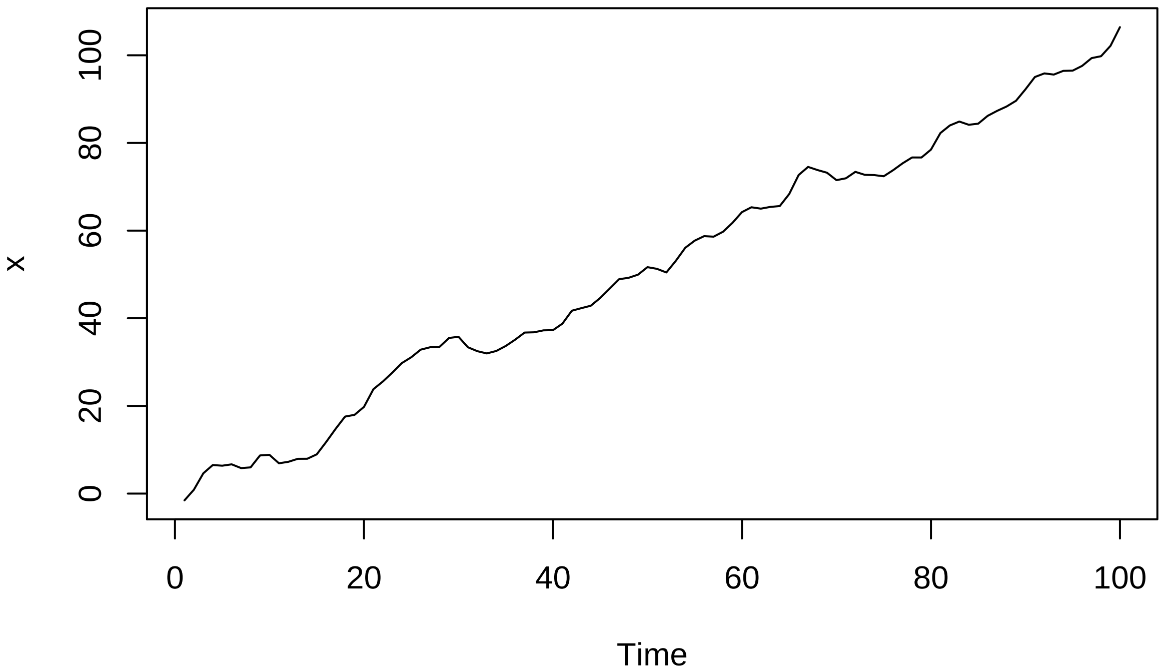
Differencing

Differencing to obtain stationarity

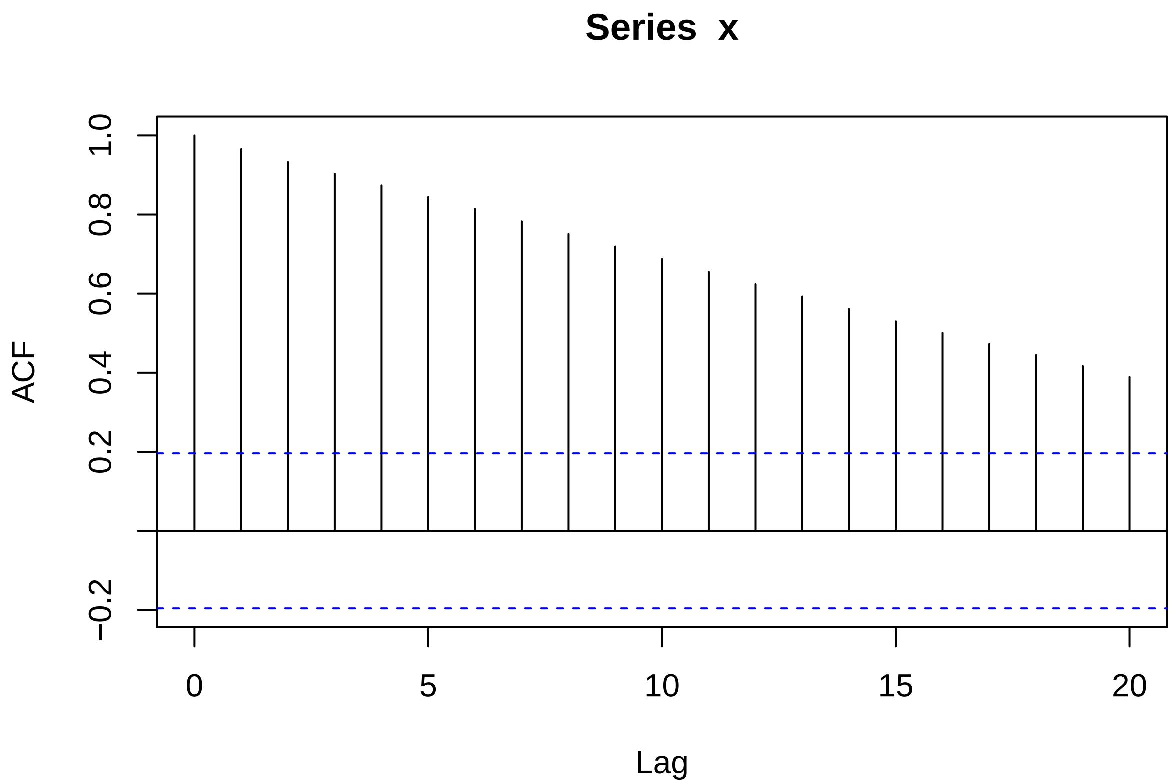
Simulate a non-stationary time series by adding a straight line to a simulated stationary ARMA.

- Confirm that it looks non-stationary by plotting the times series and the acf
- Find the process of differences, i.e. $y_t = x_t - x_{t-1}$ - does this look more stationary?

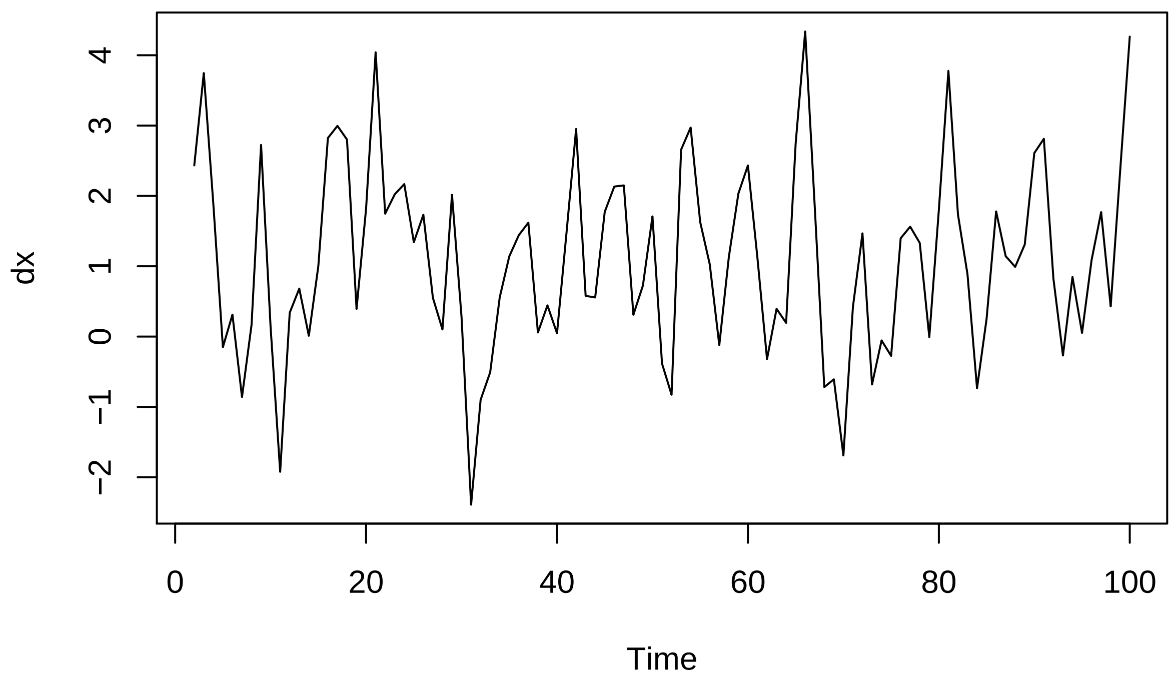
```
x = arima.sim(100,model = list(ar=0.9,ma=0.9)) + 1:100
ts.plot(x)
```



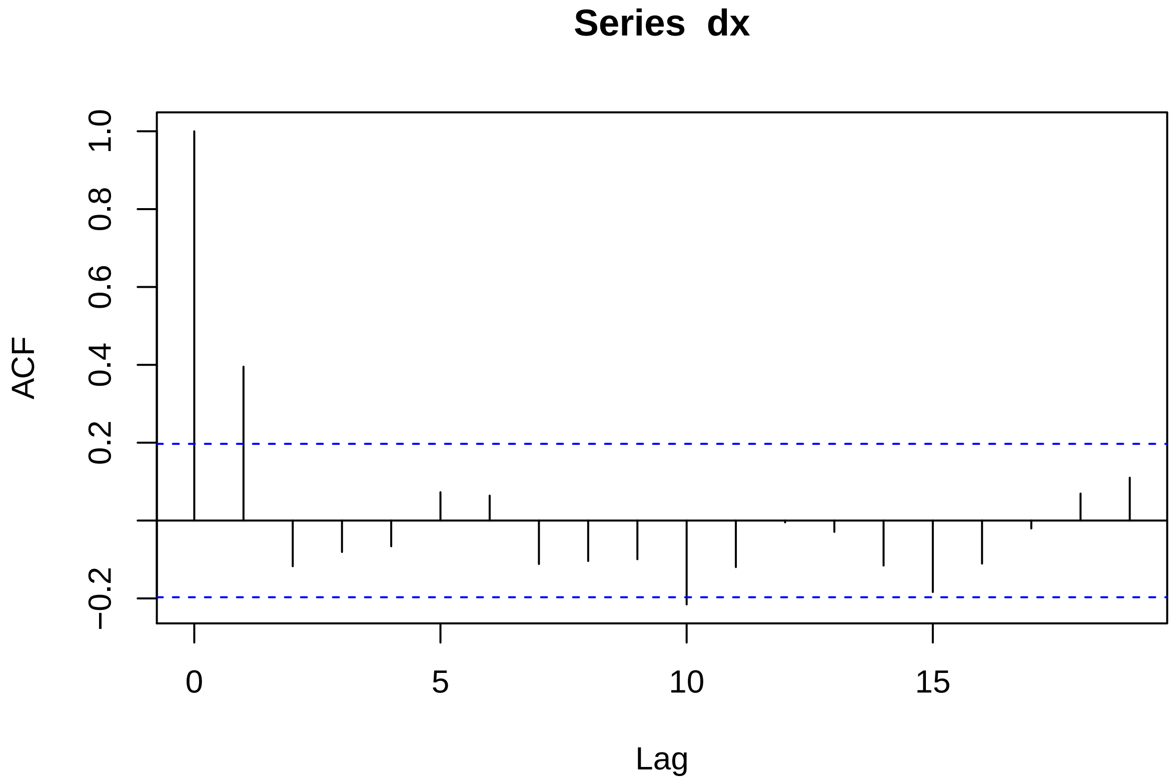

```
acf(x)
```




```
dx = diff(x)
ts.plot(dx)
```




```
acf(dx)
```


Series dx
ACF
1.0
0.8
0.6
0.4
0.2
−0.2
0
5
10
15
Lag