# cross correlation function

Cross correlation function

Compare uncorrelated and correlated times series with the cross correlation function: - Simulate both uncorrelated and correlated time series data, for example by simulating x and y as two independent ARMA processes and then creating z = x + y or z = x - y (then x and y are uncorrelated, but z is correlated with both x and y). - Make cross correlation plots comparing the processes, and inverpret. - Try to delay one of the processes and check whether the cross correlation plot can identify the delay.
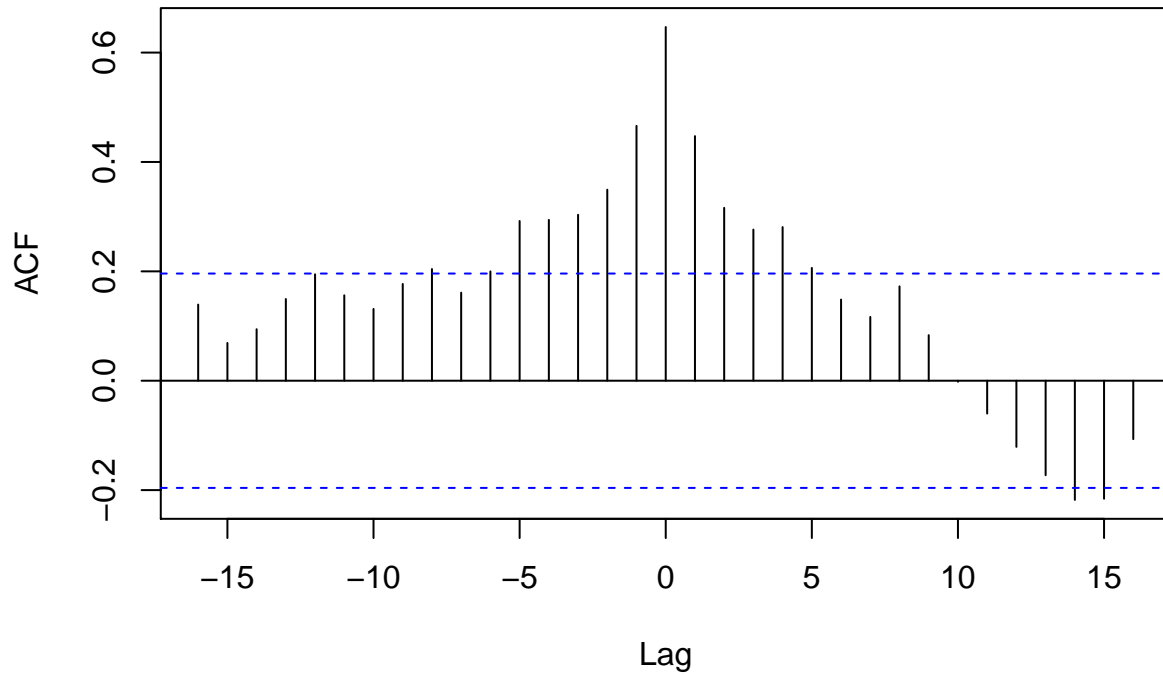
Uncorrelated x and y, but z is correlated with both x and y:

```
x = arima.sim(model=list(ar=0.8),n=100)
y = arima.sim(model=list(ar=0.8),n=100)
z = x-y
ccf(x,y)
```
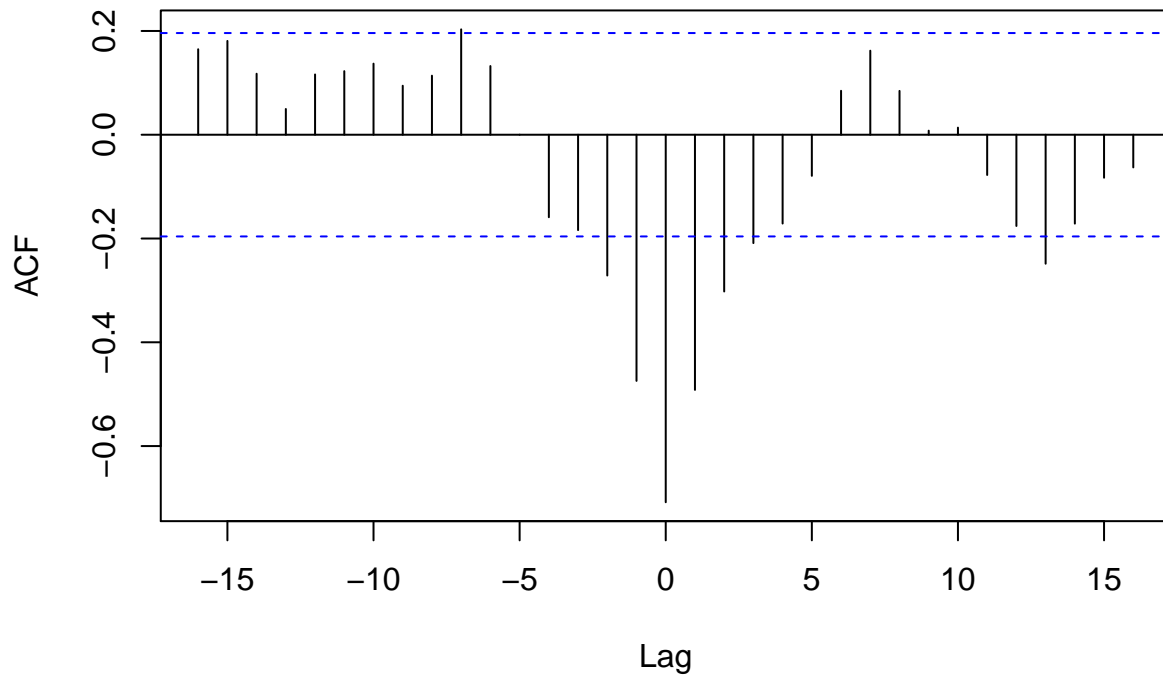

x & y

```
ccf(x,z)
```

x & z
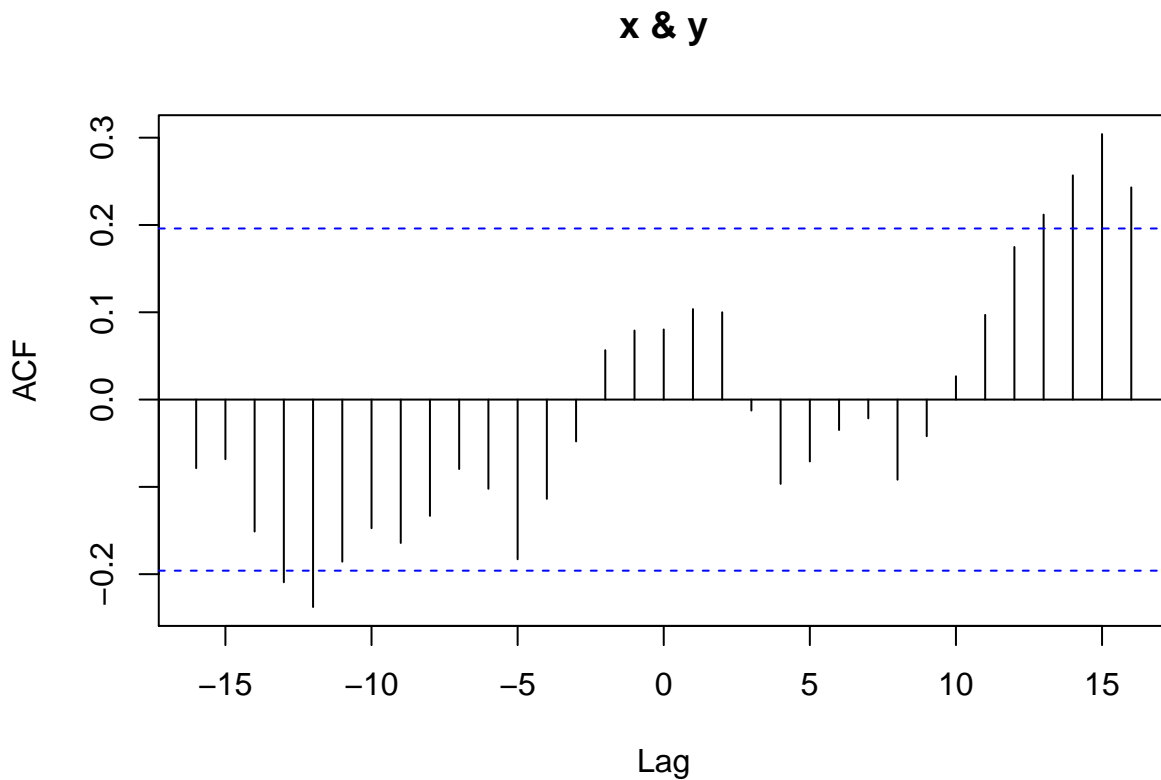

```r
ccf(y,z)
```

y & z

z now depends on y, but with a delay of 4 time units:

```
x = arima.sim(model=list(ar=0.8),n=100)
y = arima.sim(model=list(ar=0.8),n=100)
z = x+lag(y,-3)
ccf(y,z)
```

y & z