

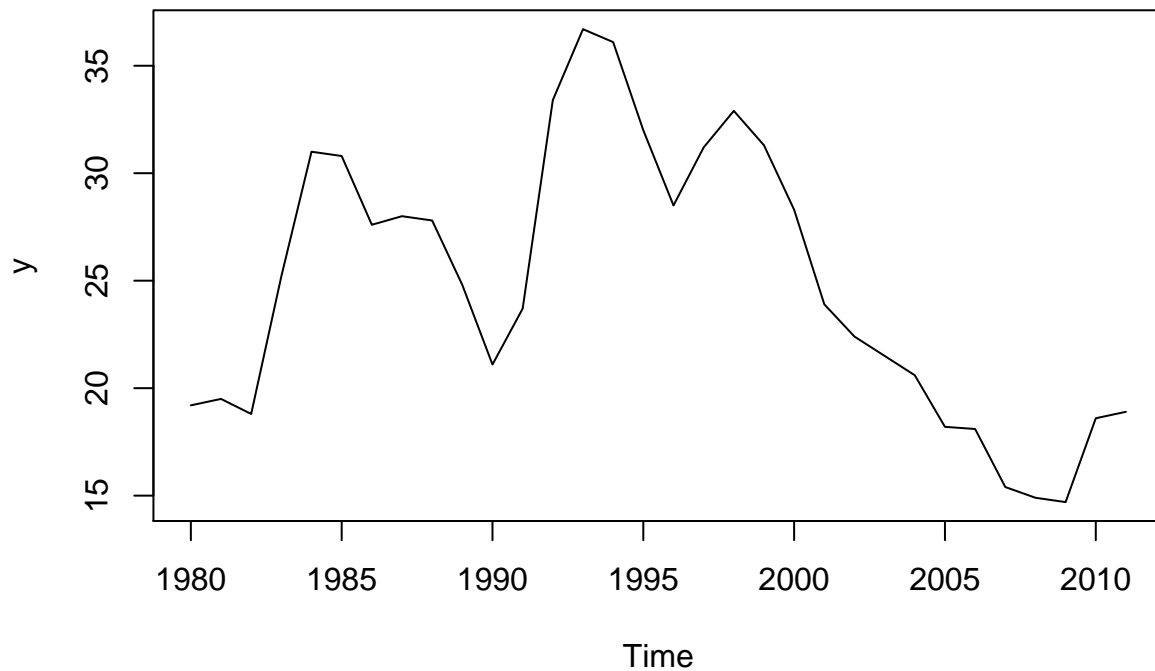
Spectrum: exercise

```
library(urca)
library(WDI)
```

```
WDIsearch('long.*term.*unemployment')
```

```
##      indicator
## [1,] "SL.UEM.LTRM.FE.ZS"
## [2,] "SL.UEM.LTRM.MA.ZS"
## [3,] "SL.UEM.LTRM.ZS"
##      name
## [1,] "Long-term unemployment, female (% of female unemployment)"
## [2,] "Long-term unemployment, male (% of male unemployment)"
## [3,] "Long-term unemployment (% of total unemployment)"
```

```
data <- WDI(indicator="SL.UEM.LTRM.ZS", country="AU", start=1980)
data <- data[order(data$year),]
y <- data$SL.UEM.LTRM.ZS
y <- ts(y, start=1980, frequency=1)
plot(y)
```



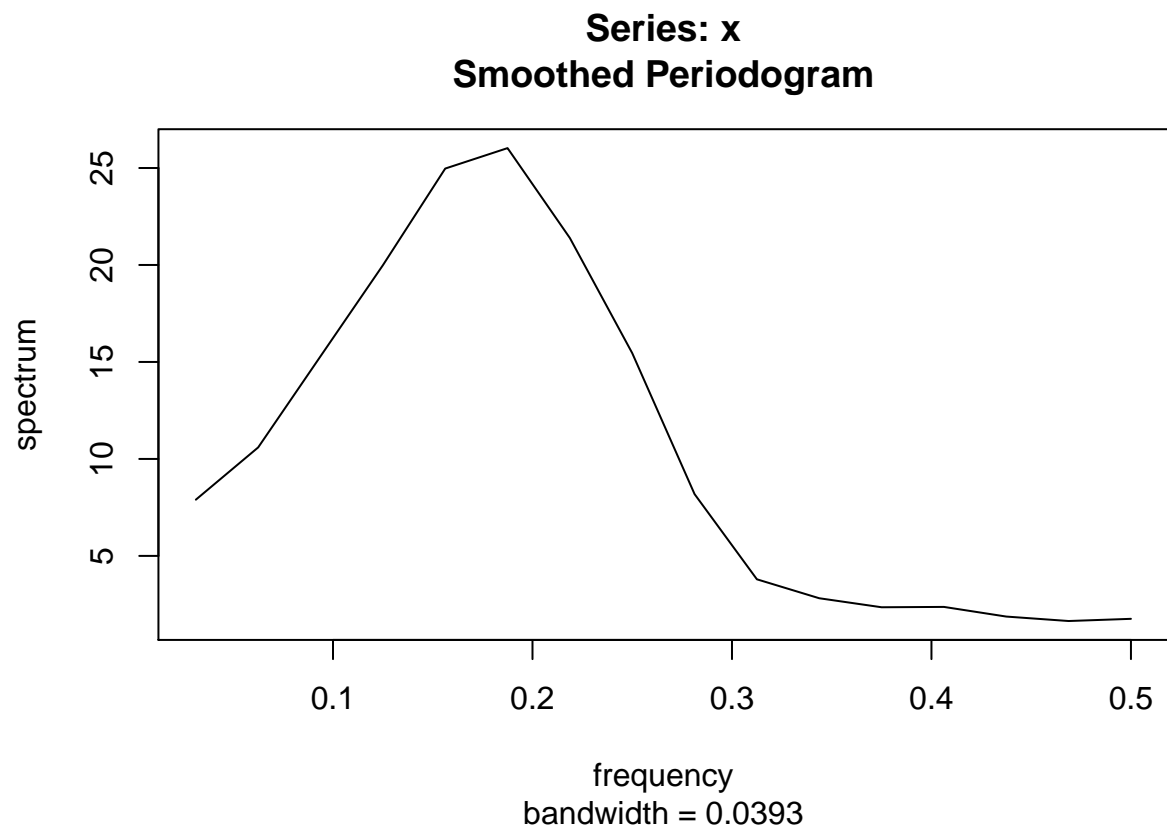
```
summary(ur.df(y, type="drift", lags=5, selectlags="BIC"))
```

```
##
## #####
## # Augmented Dickey-Fuller Test Unit Root Test #
## #####
##
## Test regression drift
##
##
## Call:
## lm(formula = z.diff ~ z.lag.1 + 1 + z.diff.lag)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -3.7834 -1.6555 -0.6091  0.7460  6.8998
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.32422    2.50062   0.530  0.60172
## z.lag.1      -0.06593    0.09416  -0.700  0.49117
## z.diff.lag1  0.57005    0.18027   3.162  0.00452 **
## z.diff.lag2 -0.42063    0.19823  -2.122  0.04535 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.61 on 22 degrees of freedom
## Multiple R-squared:  0.3818, Adjusted R-squared:  0.2975
## F-statistic: 4.529 on 3 and 22 DF,  p-value: 0.01282
##
##
## Value of test-statistic is: -0.7002 0.5245
##
## Critical values for test statistics:
##      1pct  5pct 10pct
## tau2 -3.58 -2.93 -2.60
## phi1  7.06  4.86  3.94
```

Questions:

- What are we testing with the function `ur.df` and why?
- What is the meaning of its parameters?
- What is the regression that was estimated?
- ACF test is based on the assumption of an AR model for the data. Which AR model is considered in this case?
- How is this AR model related to the estimated regression?
- Where does the test statistic come from and why? What is the hypothesis?
- What is the outcome of the test?

```
spectrum(diff(y), kernel("modified.daniell"), log="no")
```



Give an interpretation to the graph above.