

Live Session Assignment 7

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Setup

```
library(tswge)
```

```
## Warning: package 'tswge' was built under R version 3.5.3
```

```
library(dplyr)
```

```
## Warning: package 'dplyr' was built under R version 3.5.3
```

```
##
```

```
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
```

```
##
```

```
## filter, lag
```

```
## The following objects are masked from 'package:base':
```

```
##
```

```
## intersect, setdiff, setequal, union
```

```
library(tidyverse)
```

```
## Warning: package 'tidyverse' was built under R version 3.5.2
```

```
## -- Attaching packages ----- tidyverse_
```

```
## v ggplot2 3.2.1    v readr    1.1.1
```

```
## v tibble  2.1.3    v purrr   0.3.3
```

```
## v tidyr   0.8.2    v stringr 1.3.1
```

```
## v ggplot2 3.2.1    v forcats 0.3.0
```

```
## Warning: package 'ggplot2' was built under R version 3.5.3
```

```
## Warning: package 'tibble' was built under R version 3.5.3
```

```
## Warning: package 'purrr' was built under R version 3.5.3
```

```
## -- Conflicts ----- tidyverse_con
```

```
## x dplyr::filter() masks stats::filter()
```

```
## x dplyr::lag()    masks stats::lag()
```

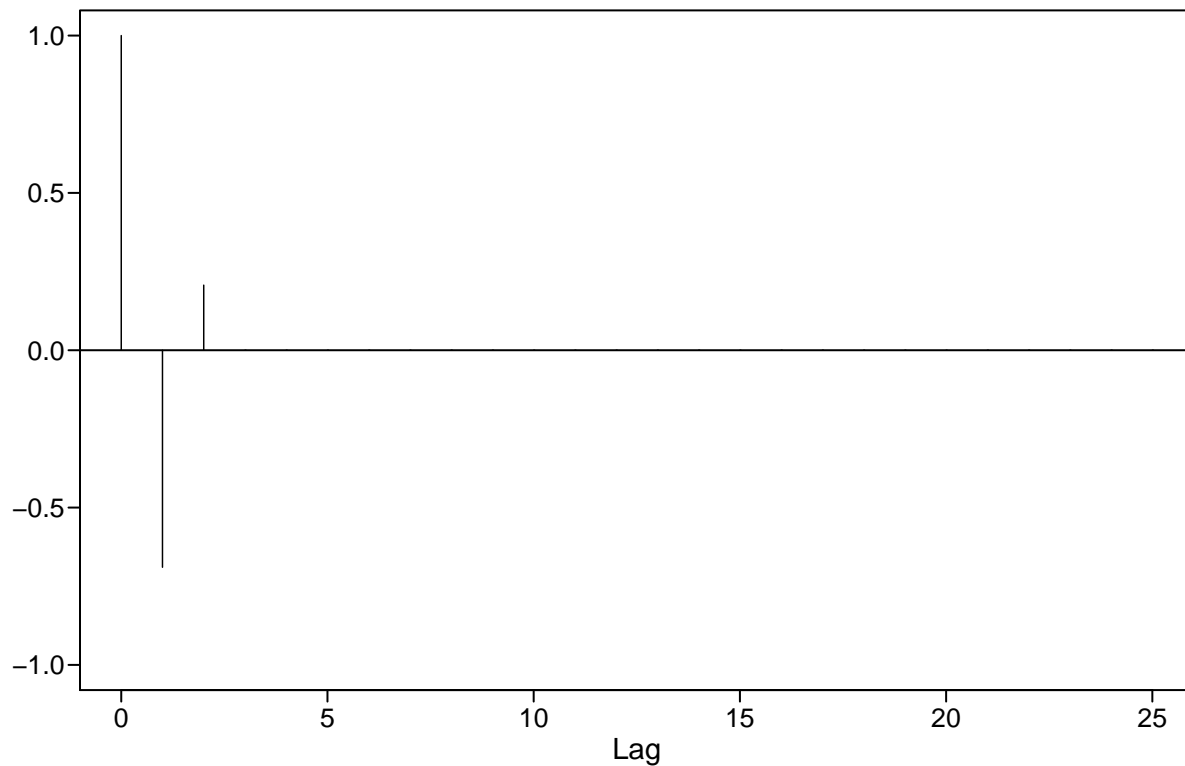
```
#source("common_functions.R")
```

My Calculations

```
# Imaginary Roots
theta = c(2, -1.5)
factor.wge(phi = theta)
```

```
##
## Coefficients of Original polynomial:
## 2.0000 -1.5000
##
## Factor          Roots          Abs Recip    System Freq
## 1-2.0000B+1.5000B^2  0.6667+-0.4714i    1.2247    0.0980
##
##
```

```
acf1 = true.arma.aut.wge(theta = theta)
```



```
# Non Invertible since abs reciprocal > 1 for one of the roots
# The invertible model will have the reciprocal of the current roots
```

```
# Original Roots
root1_org = complex(real = 0.6667, imaginary = 0.4714)
root2_org = complex(real = 0.6667, imaginary = -0.4714)
```

```
# Inverse of the roots
inv_root1 = 1/root1_org
inv_root2 = 1/root2_org
```

```

inv_root1

## [1] 0.9999897-0.7070574i
inv_root2

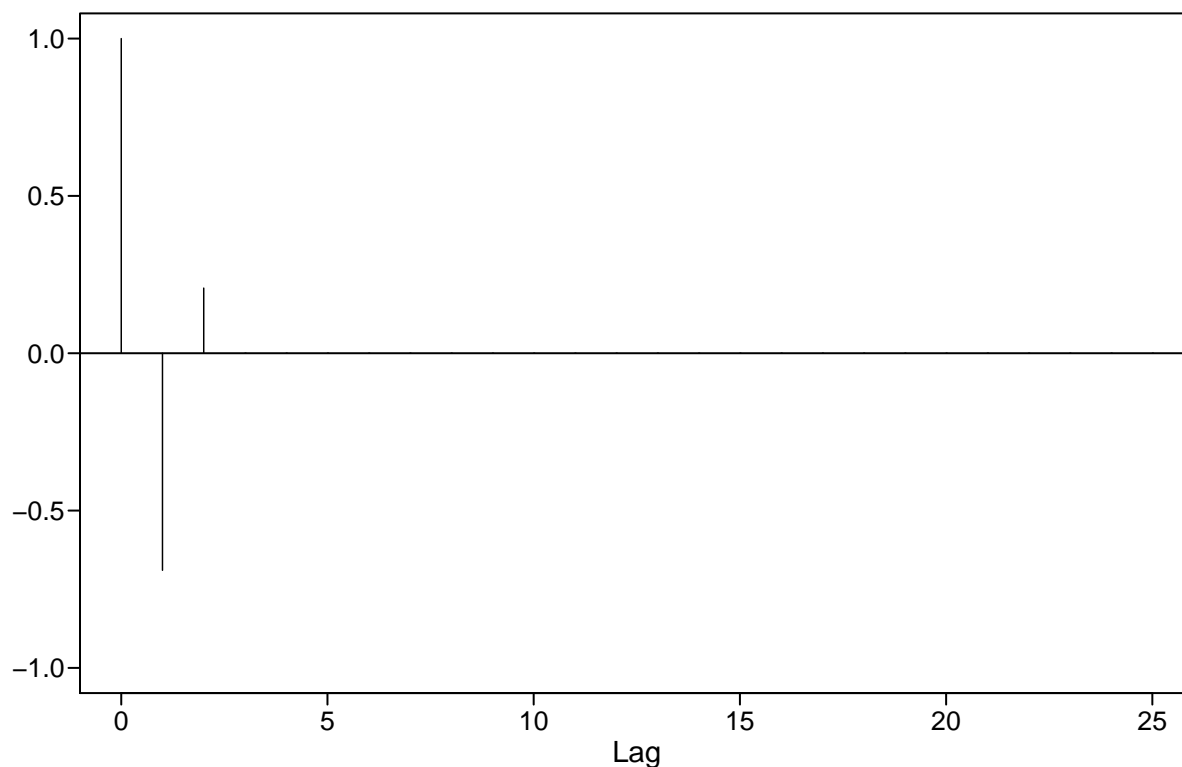
## [1] 0.9999897+0.7070574i
# Compute Characteristic Equation
prod = inv_root1 * inv_root2
prod

## [1] 1.49991+0i
# Char equation: (z - inv_root1) * (z - inv_root2)
# = [Z - (1 -0.707i)] * [Z - (1 + 0.717i)]
# = Z^2 -Z -0.717i*Z -Z +0.717i*Z + prod
# = Z^2 -2Z + 1.5
# = 1 -1.3333Z + 0.6667Z^2

theta = c(1.333, -0.667)
factor.wge(phi = theta)

##
## Coefficients of Original polynomial:
## 1.3330 -0.6670
##
## Factor          Roots          Abs Recip    System Freq
## 1-1.3330B+0.6670B^2    0.9993+-0.7076i    0.8167      0.0981
##
##
acf2 = true.arma.aut.wge(theta = theta)

```



True Autocorrelations

```
print(paste0("Are the ACFs for the 2 models equal: ", all(round(acf1$acf,3) == round(acf2$acf,3))))
```

```
## [1] "Are the ACFs for the 2 models equal: TRUE"
```

```
cat("\n-----\n")
```

```
##
```

```
## -----
```

```
print(acf1$acf)
```

```
## [1] 1.000000 -0.6896552 0.2068966 0.0000000 0.0000000 0.0000000
## [7] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## [13] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## [19] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## [25] 0.0000000 0.0000000
```

```
cat("\n-----\n")
```

```
##
```

```
## -----
```

```
print(acf2$acf)
```

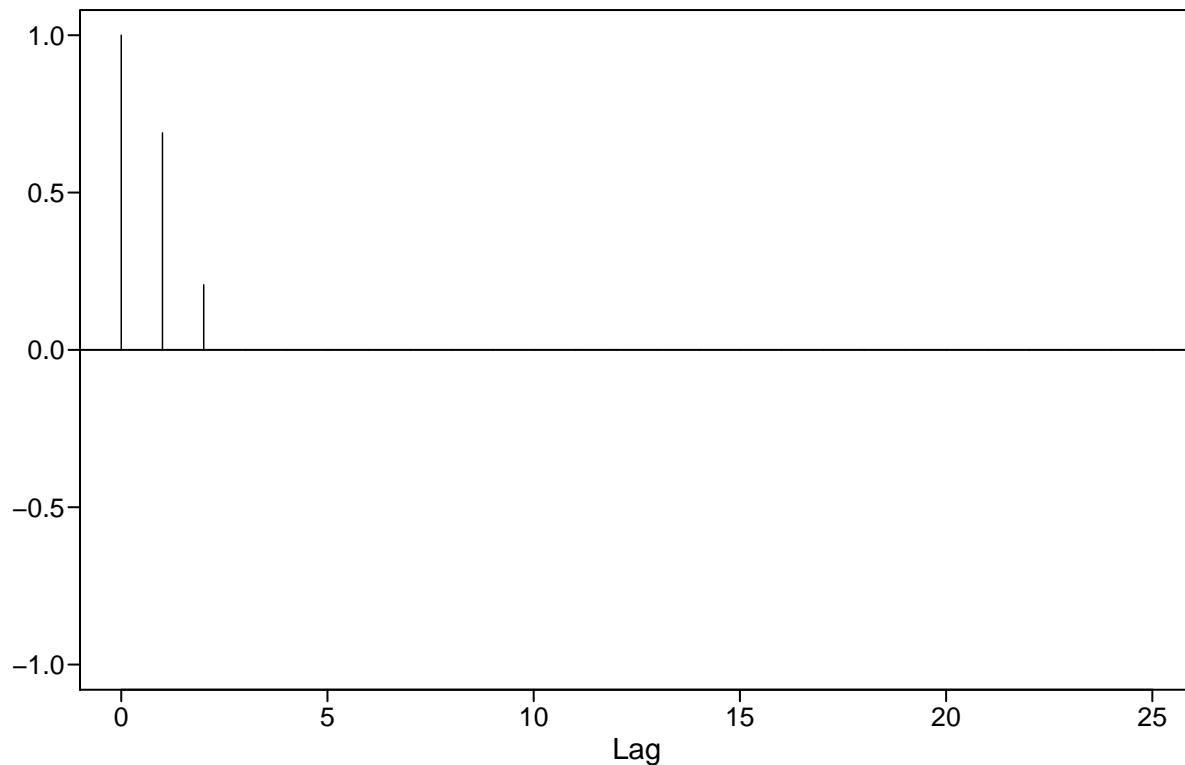
```
## [1] 1.0000000 -0.6897157 0.2070285 0.0000000 0.0000000 0.0000000
## [7] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## [13] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## [19] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## [25] 0.0000000 0.0000000
```

Answer provided in HW Solutions

```
theta = c(-1.333, -0.667)
factor.wge(phi = theta)
```

```
##
## Coefficients of Original polynomial:
## -1.3330 -0.6670
##
## Factor          Roots          Abs Recip    System Freq
## 1+1.3330B+0.6670B^2  -0.9993+-0.7076i    0.8167      0.4019
##
##
```

```
acf3 = true.arma.aut.wge(theta = theta)
```



```
print(paste0("Are the ACFs for the 2 models equal: ", all(round(acf1$acf,3) == round(acf3$acf,3))))
```

```
## [1] "Are the ACFs for the 2 models equal: FALSE"
```

```
cat("\n-----\n")
```

```
##
```

```
## -----
```

```
print(acf1$acf)
```

```
## [1] 1.0000000 -0.6896552 0.2068966 0.0000000 0.0000000 0.0000000
## [7] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
```

```
## [13] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## [19] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## [25] 0.0000000 0.0000000
```

```
cat("\n-----\n")
```

```
##
```

```
## -----
```

```
print(acf3$acf)
```

```
## [1] 1.0000000 0.6897157 0.2070285 0.0000000 0.0000000 0.0000000 0.0000000
## [8] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## [15] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## [22] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
```