

# Časovne vrste - seminarska naloga

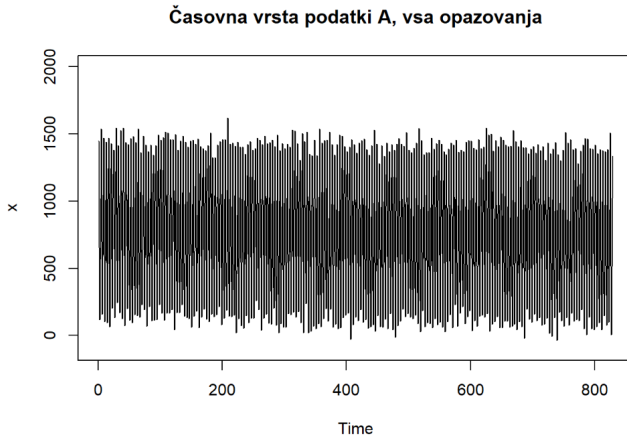
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Brina Pirc in Anja Trobec

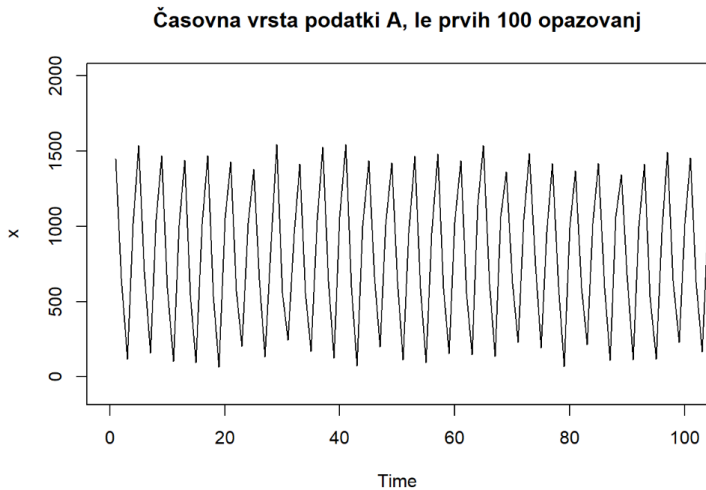
Maj, 2022

Fakulteta za Matematiko in Fiziko

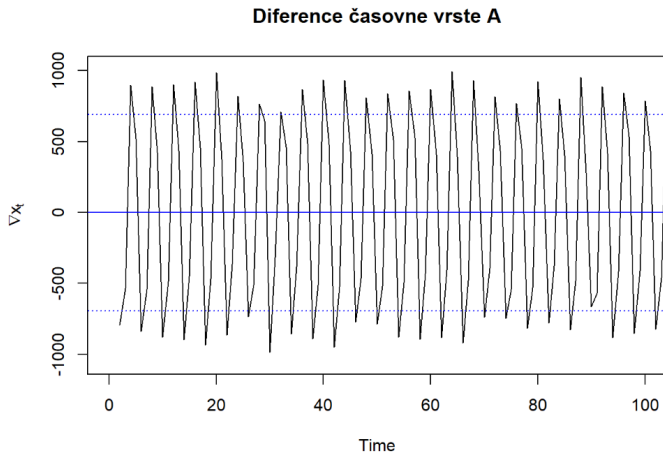
# Časovna vrsta A



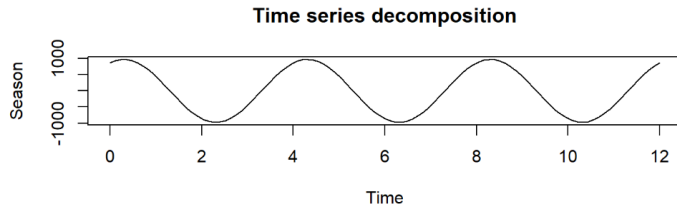
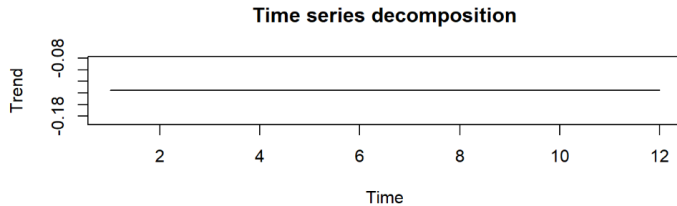
## Časovna vrsta A - 100 opazovanj



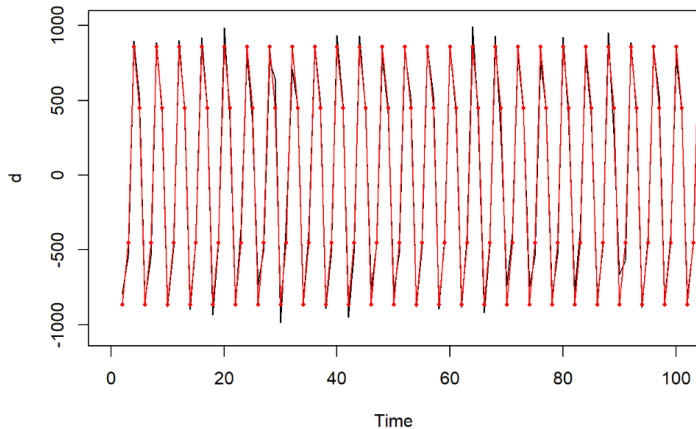
# Diference



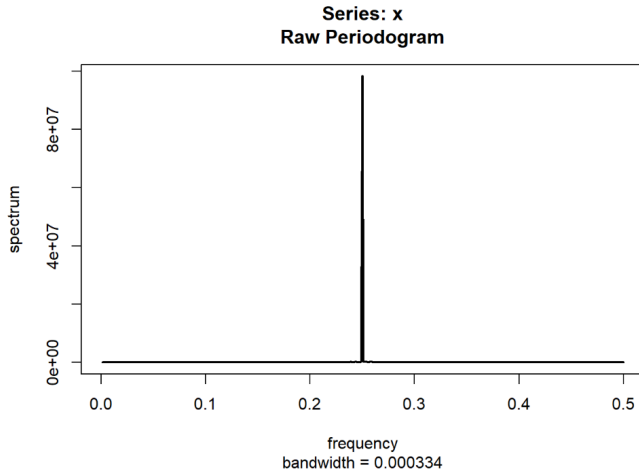
# Trend in sezonskost - dekompozicija



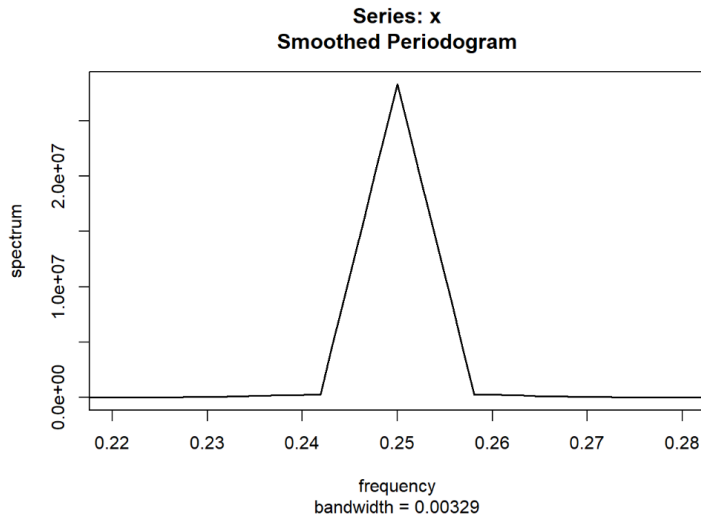
# Harmonična regresija



# Surovi periodogram

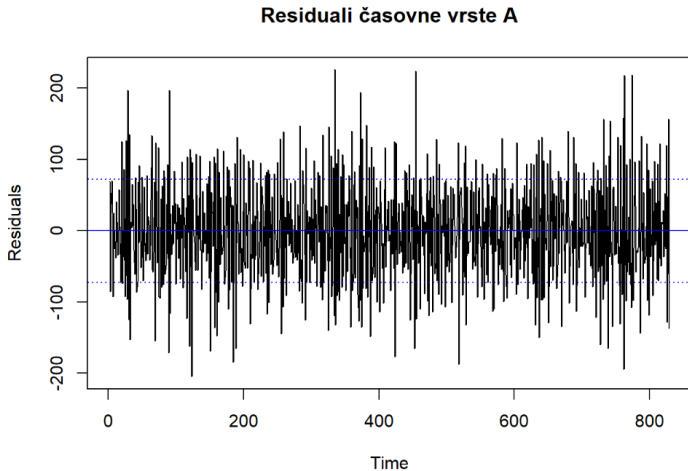


# Zglajeni periodogram



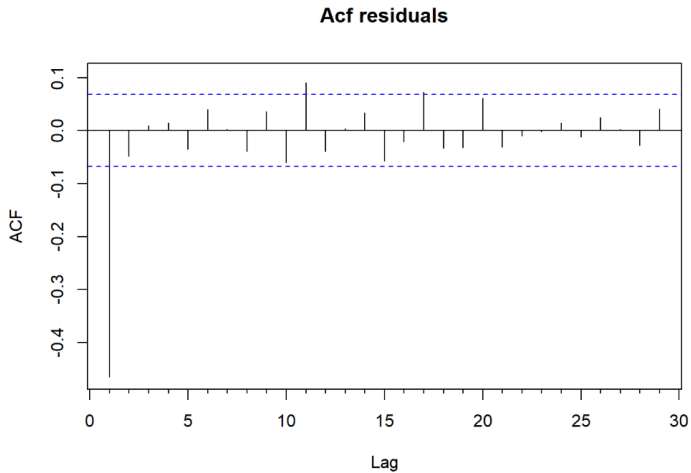


# Residuali - stacionarnost

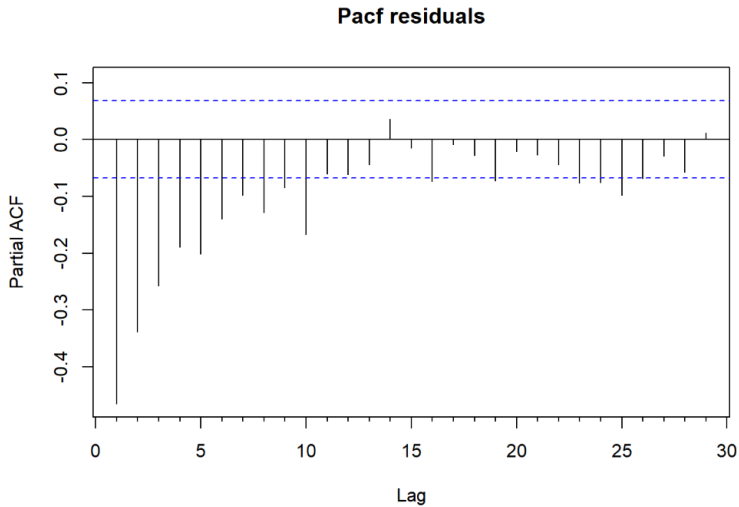


```
##  
## Augmented Dickey-Fuller Test  
##  
## data: d.res  
## Dickey-Fuller = -16.866, Lag order = 9, p-value = 0.01  
## alternative hypothesis: stationary
```

## ACF in predlog za model MA(p)



## PACF in predlog za model AR(q)

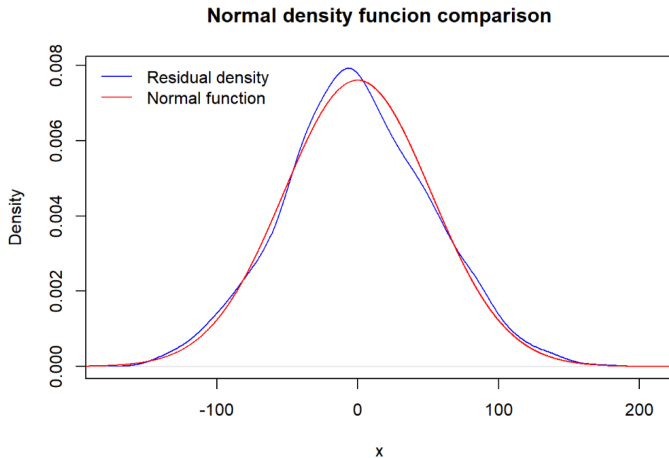


## Izbira modela ARMA(p,q) za $p + q \leq 3$

```
##  
## Call:  
## arima(x = d.res, order = c(0, 0, 1))  
##  
## Coefficients:  
##          mal  intercept  
##      -0.9897    0.0537  
## s.e.   0.0060    0.0214  
##  
## sigma^2 estimated as 2748:  log likelihood = -4455.07,  aic = 8916.14
```

```
## [1] "Izbrali sva model MA(1)."
```

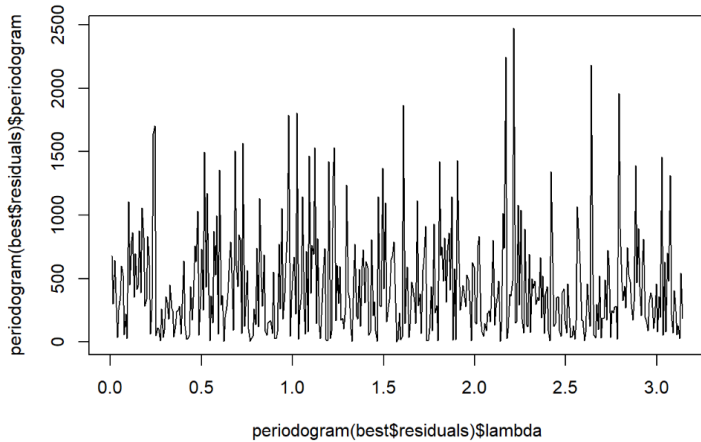
# Test za normalno porazdelitev



# Test za normalno porazdelitev

```
##  
## Shapiro-Wilk normality test  
##  
## data: best$residuals  
## W = 0.99795, p-value = 0.4167
```

# White Noise



# White Noise

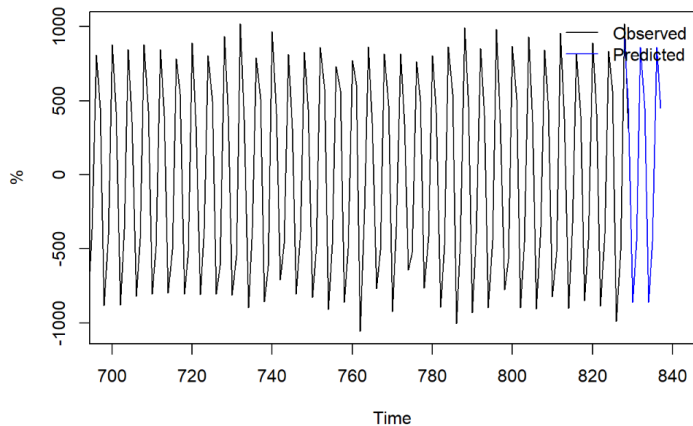
```
##  
## Box-Pierce test  
##  
## data: d.res  
## X-squared = 179.27, df = 1, p-value < 2.2e-16
```

```
##  
## Box-Ljung test  
##  
## data: d.res  
## X-squared = 179.92, df = 1, p-value < 2.2e-16
```

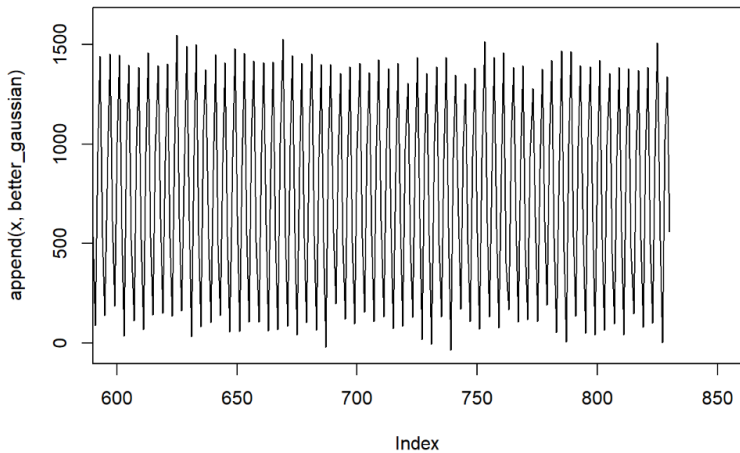
```
## [1] "Ne gre za white noise."
```



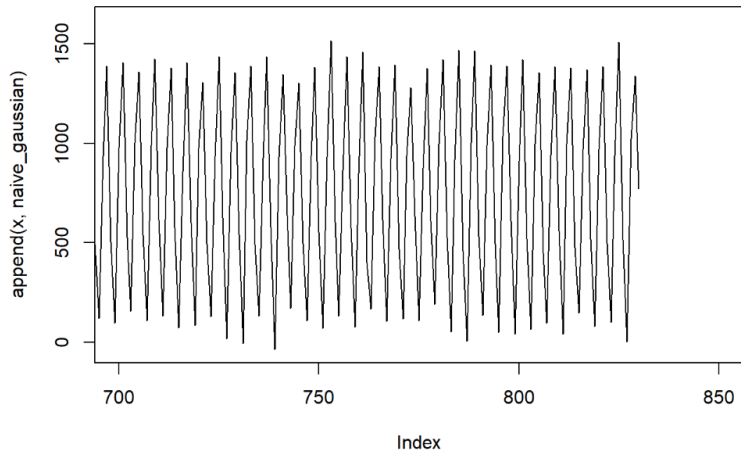
## Napoved časovne vrste A



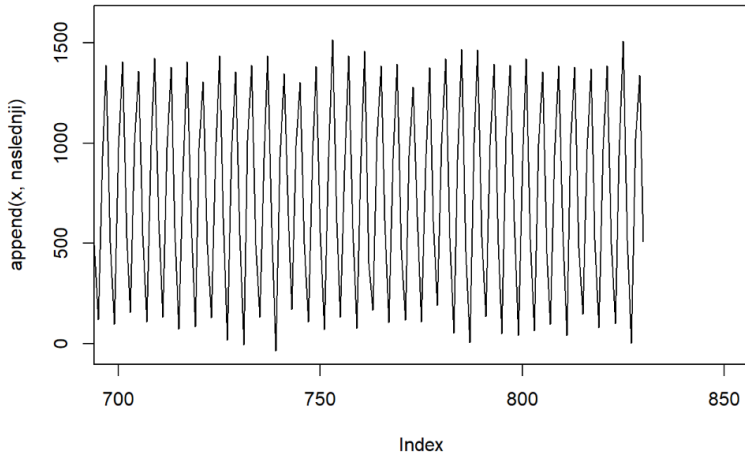
## Gaussova napoved



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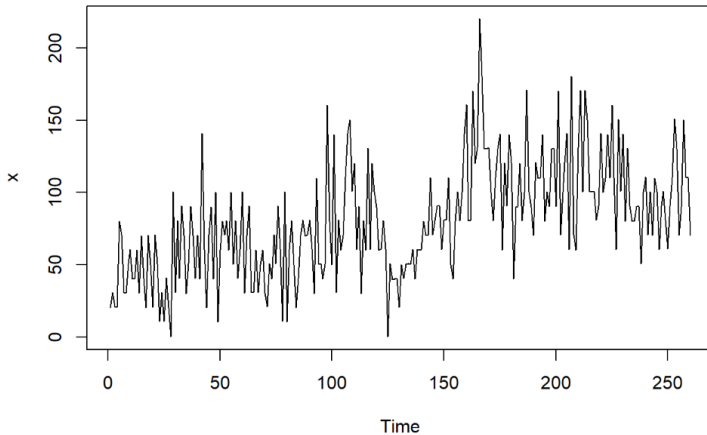
## Gaussova napoved



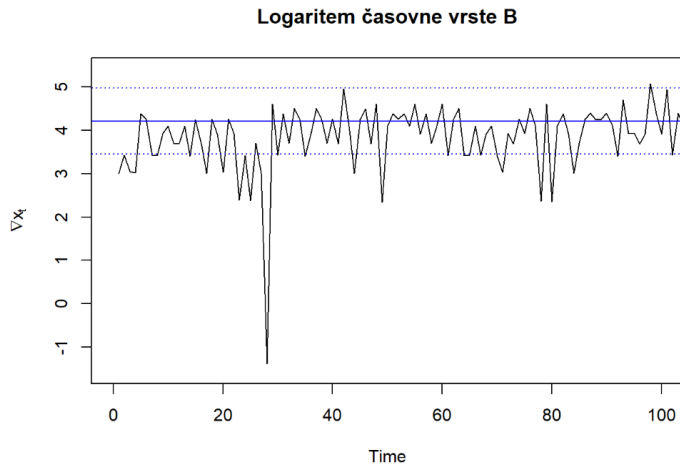


## Časovna vrsta B

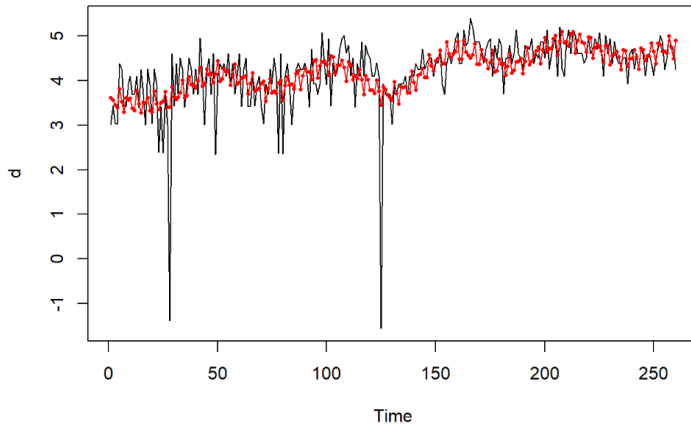
Časovna vrsta podatki B, vsa opazovanja



# Logaritmirana časovna vrsta B



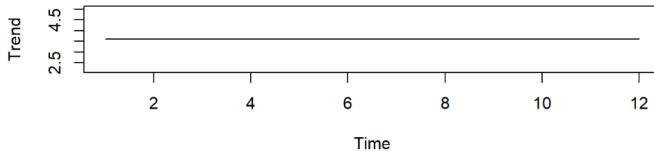
# Harmonična regresija



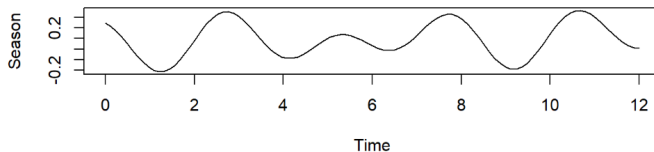


# Trend in sezonskost - dekompozicija

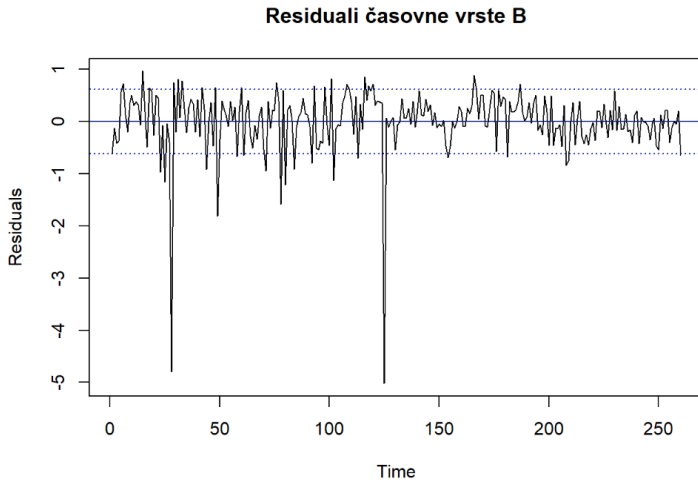
**Time series decomposition**



**Time series decomposition**



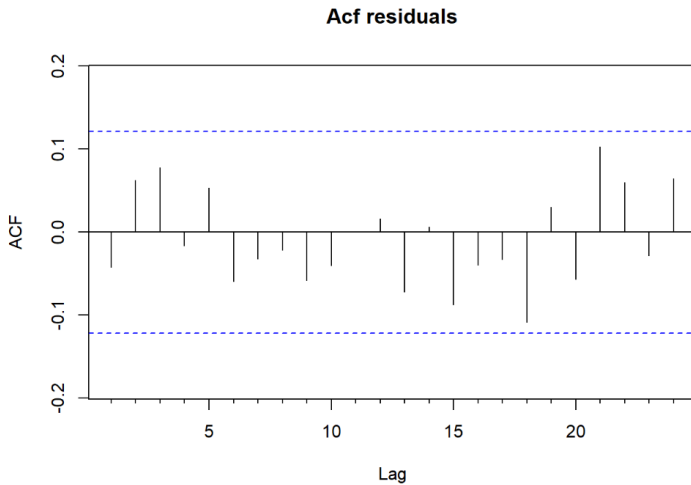
## Residuali - stacionarnost



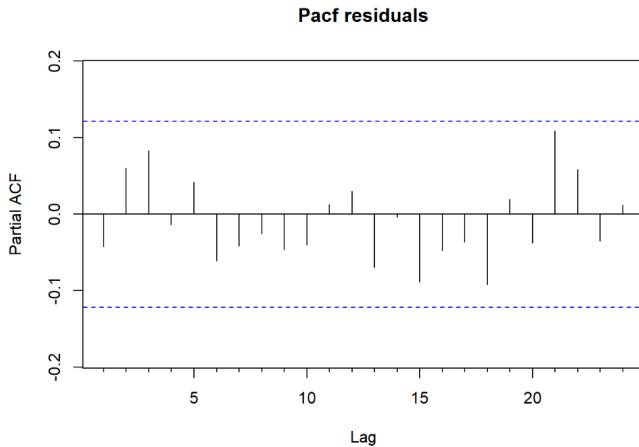
## Residuali - stacionarnost

```
##  
## Augmented Dickey-Fuller Test  
##  
## data: d.res  
## Dickey-Fuller = -5.9954, Lag order = 6, p-value = 0.01  
## alternative hypothesis: stationary  
  
## [1] "Augmented Dickey-Fuller Test ne zavrne stacionarnosti."
```

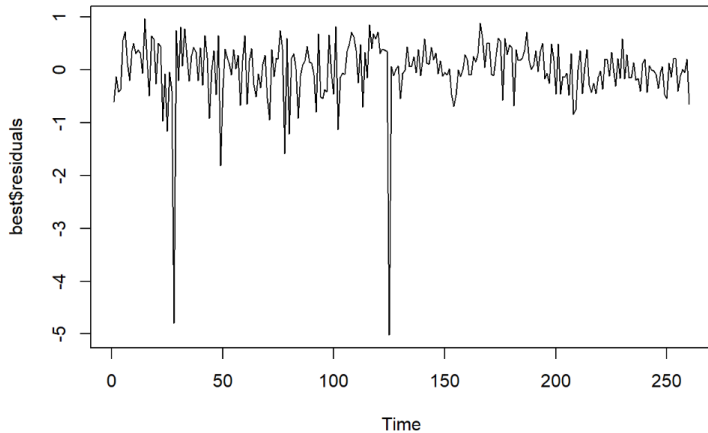
# ACF



# PACF



# Residuali

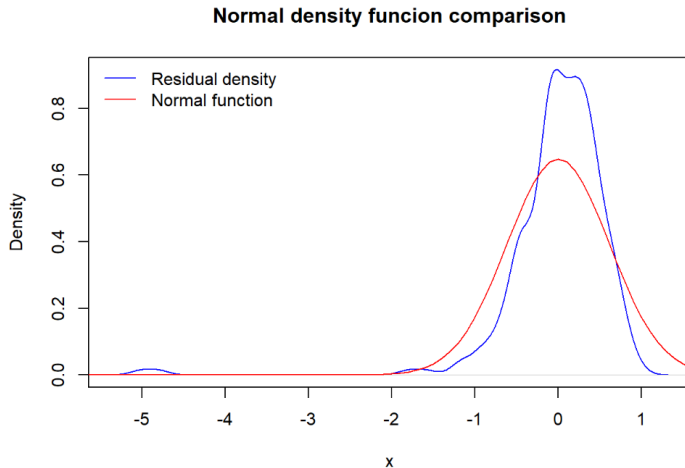


# Izbira modela

```
##  
## Call:  
## arima(x = d.res, order = c(0, 0, 0))  
##  
## Coefficients:  
##      intercept  
##      0.0000  
## s.e.      0.0381  
##  
## sigma^2 estimated as 0.378:  log likelihood = -242.45,  aic = 488.91
```

```
## [1] "Algoritem vrne predlog za model ARMA(0,0)."
```

# Test za normalno porazdelitev



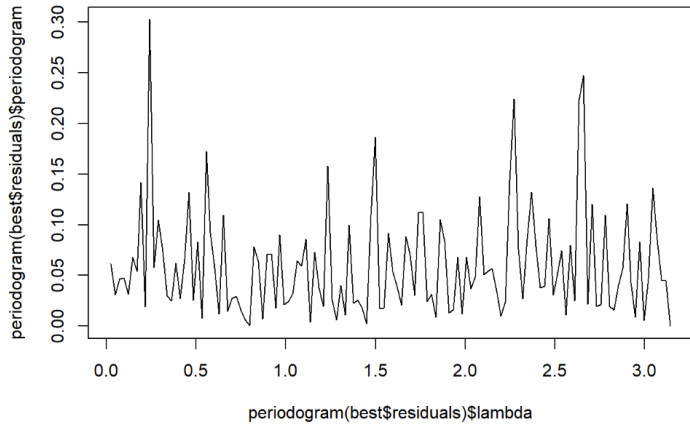


# Test za normalno porazdelitev

```
##  
## Shapiro-Wilk normality test  
##  
## data: best$residuals  
## W = 0.71579, p-value < 2.2e-16
```

```
## [1] "Shapiro test zavrne hipotezo, torej ne gre za normalno porazdeli  
tev, kar je očitno tudi z grafa."
```

# White Noise



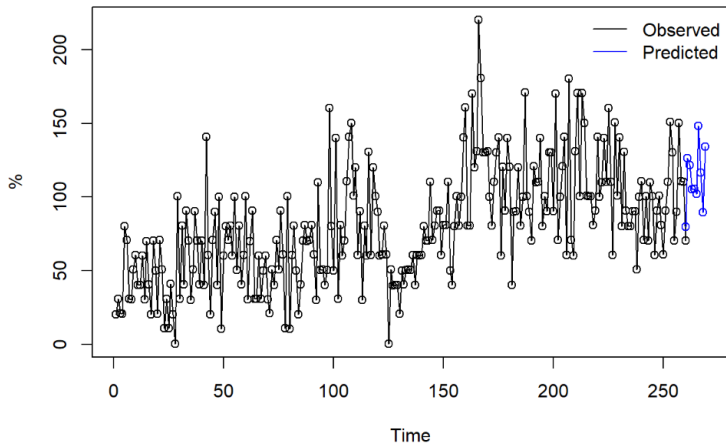
# White Noise

```
##  
## Box-Pierce test  
##  
## data: d.res  
## X-squared = 0.46321, df = 1, p-value = 0.4961
```

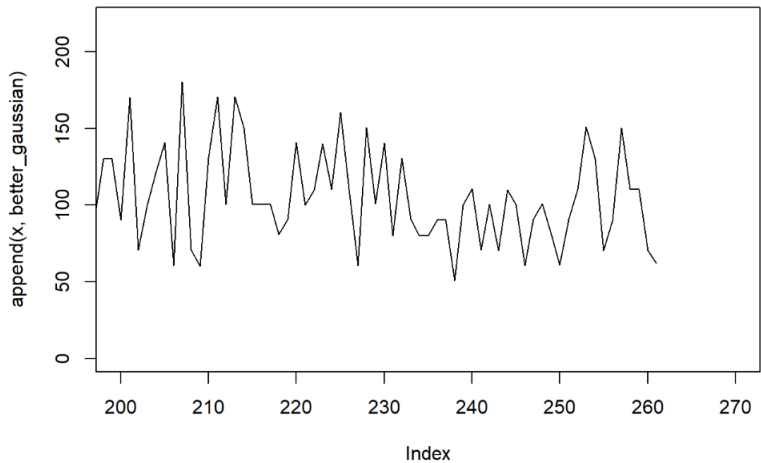
```
##  
## Box-Ljung test  
##  
## data: d.res  
## X-squared = 0.46858, df = 1, p-value = 0.4936
```

```
## [1] "Imamo white noise!"
```

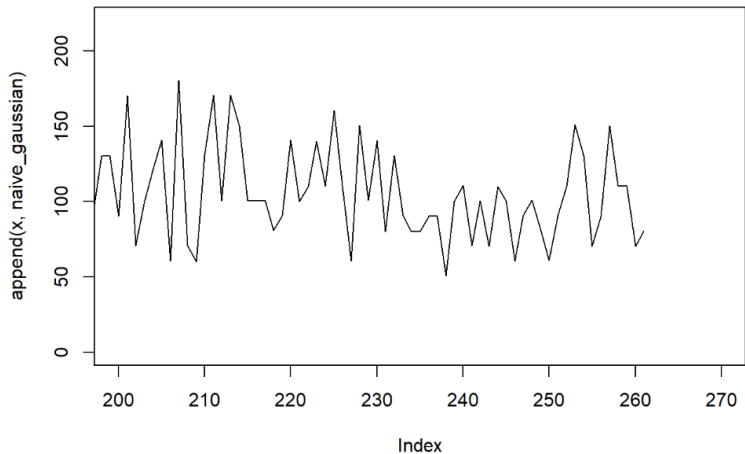
## Napoved časovne vrste B



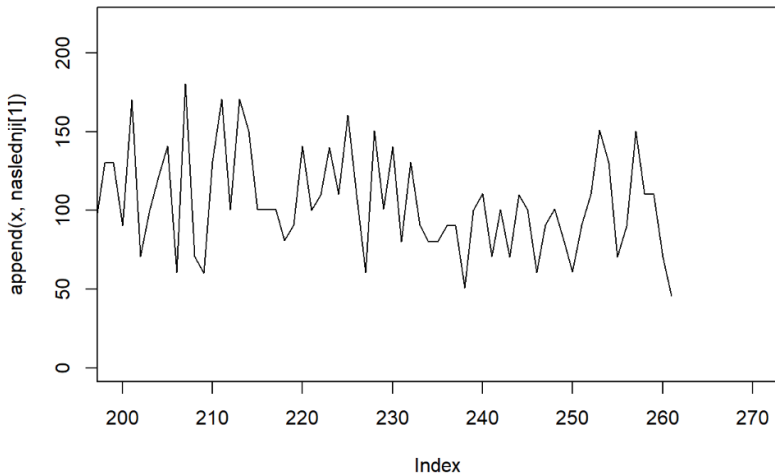
## Gaussova napoved



## Gaussova napoved



## Gaussova napoved



Hvala za pozornost!