Analysis

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```
library(forecast)
```

```
## Registered S3 method overwritten by 'quantmod':
##   method            from
##   as.zoo.data.frame zoo
```

```
library(tseries)
library(fUnitRoots)
library(astsa)
```

```
##
## Attaching package: 'astsa'
```

```
## The following object is masked from 'package:forecast':
##
##     gas
```

```
library(readr)
```

Practice Data 4

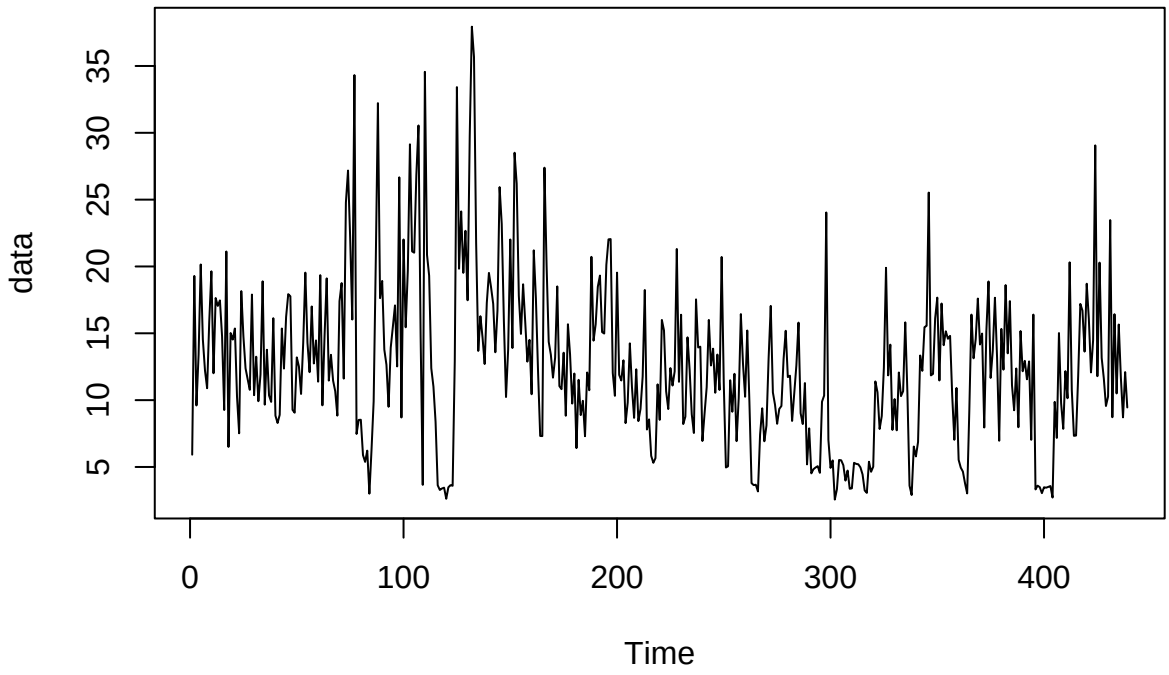
```
data <- read.csv("energy_final.csv", header = TRUE)
```

```
data <- as.vector(data$energy_used)
head(data)
```

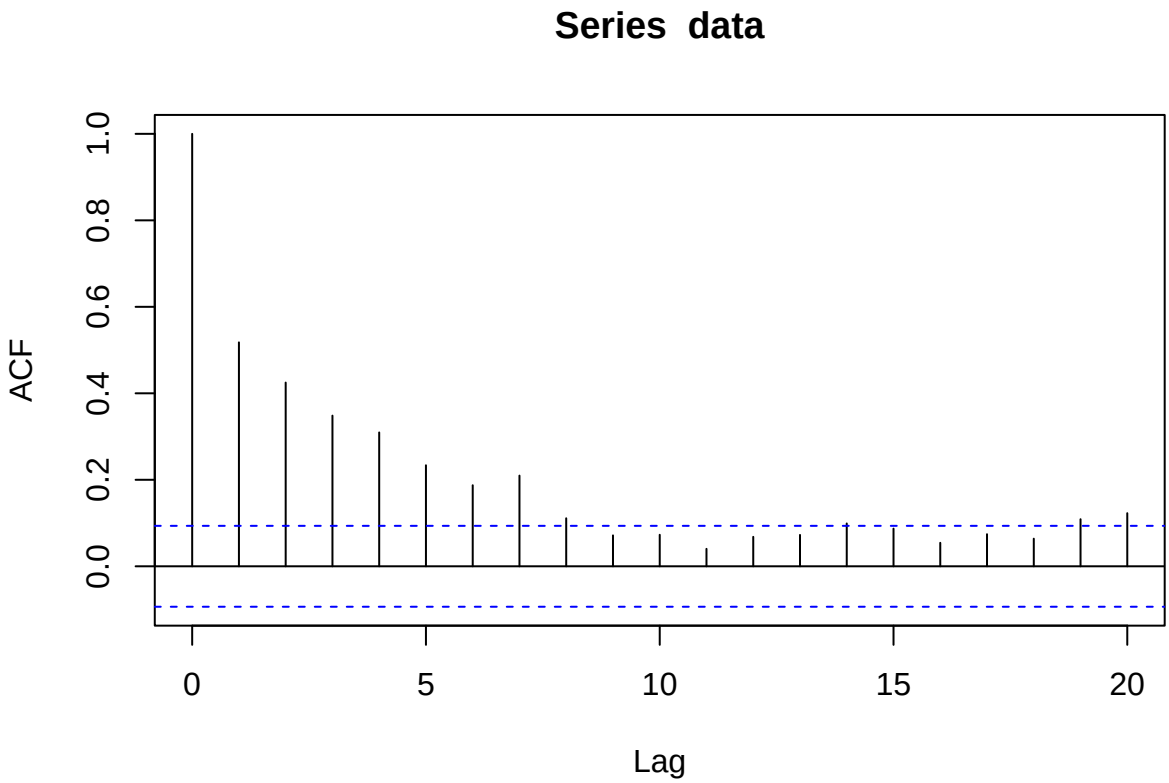
```
## [1]  5.92 19.29  9.60 13.39 20.15 14.54
```

```
write.table(data, file = "energy.txt")
```

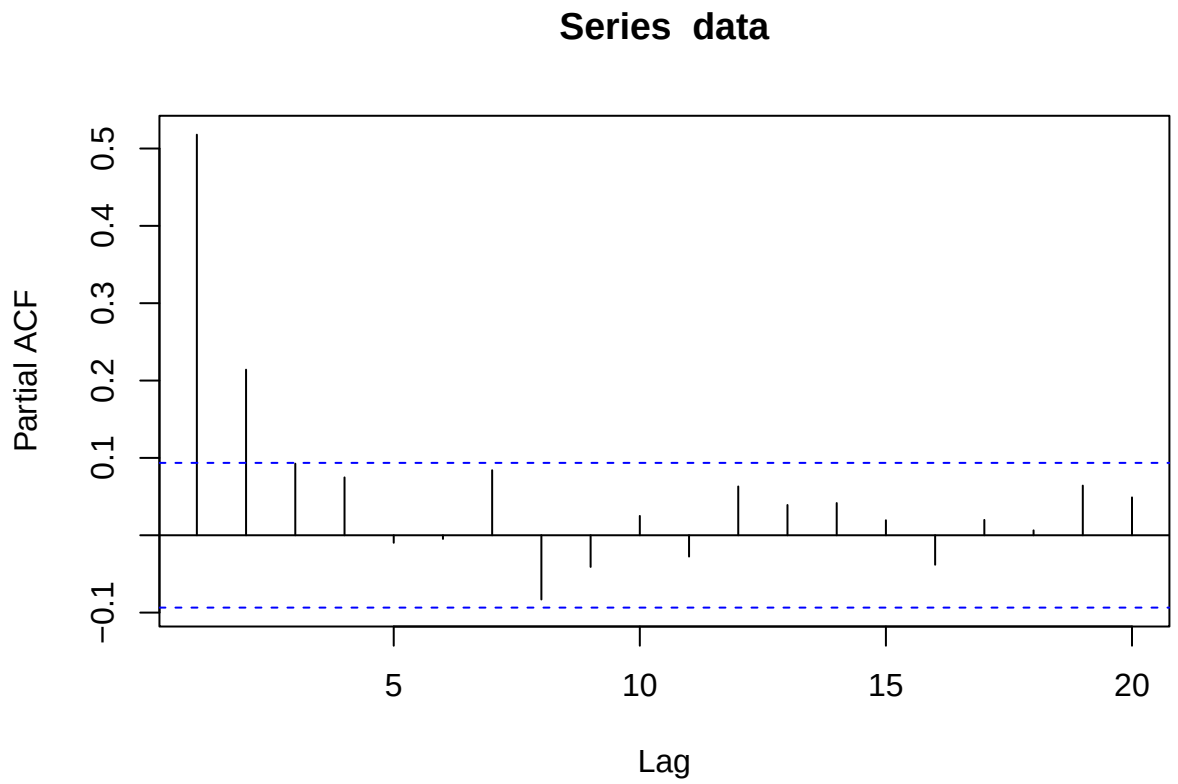
```
plot.ts(data)
```



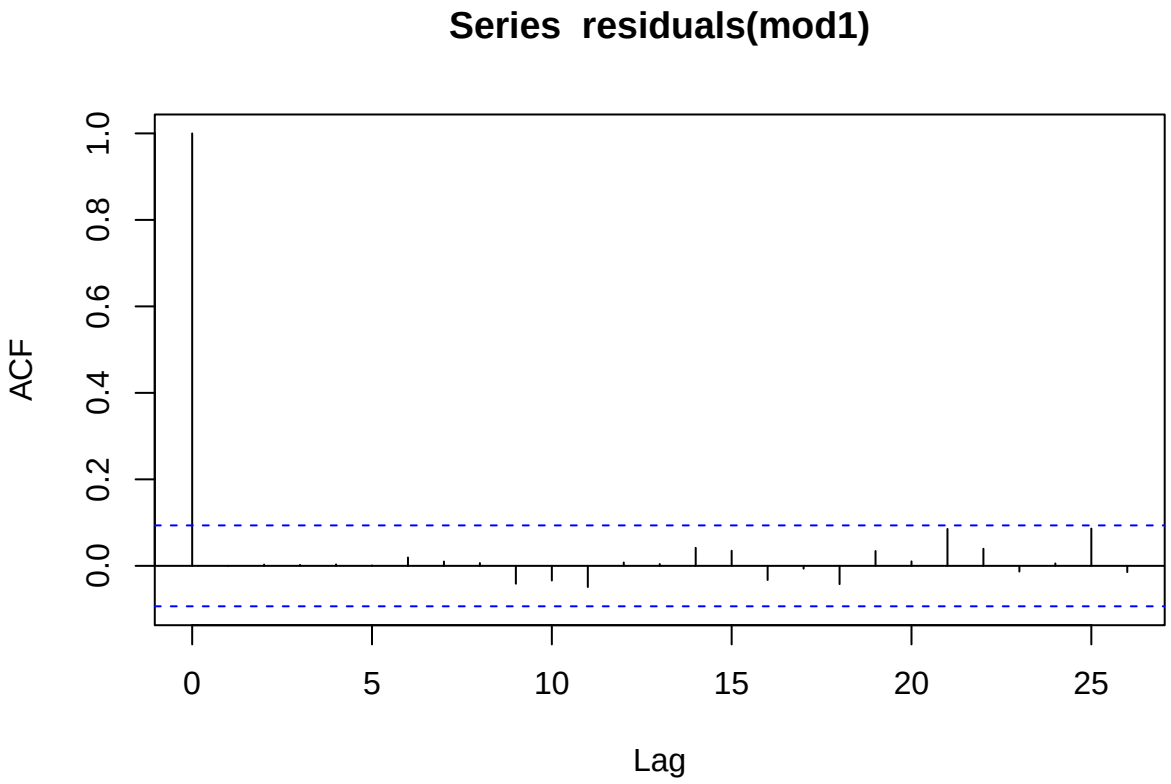

```
acf(data, lag.max = 20)
```



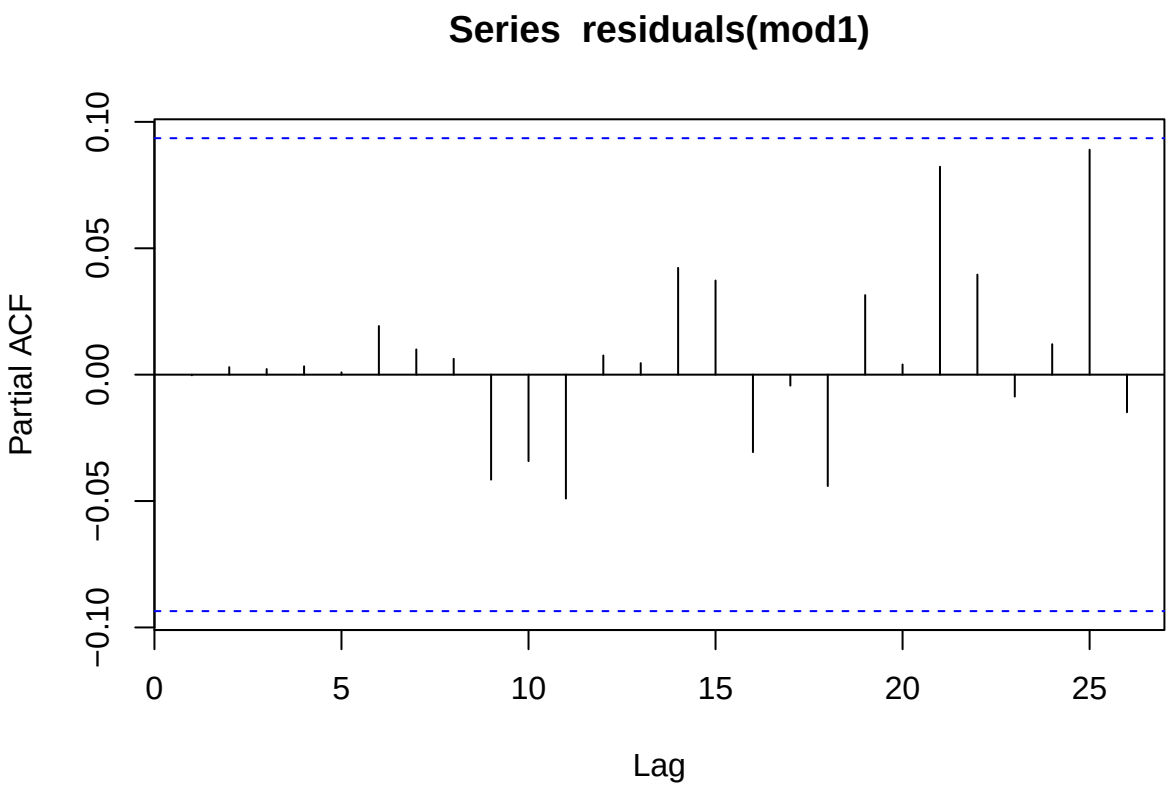

```
pacf(data, lag.max = 20)
```




```
mod1= arima(data, order = c(7, 0, 2))
acf(residuals(mod1))
```



```
pacf(residuals(mod1))
```




```
print(AIC(mod1))
```

```
## [1] 2689.39
```

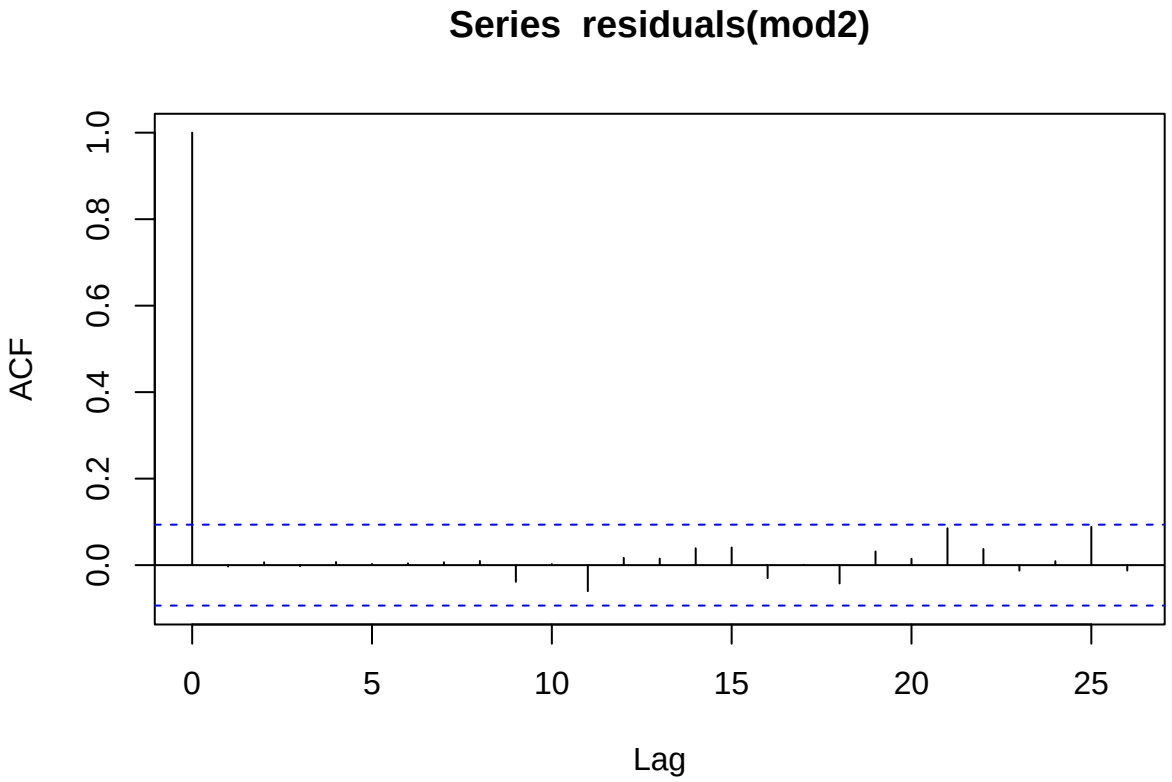
```
print(BIC(mod1))
```

```
## [1] 2734.32
```

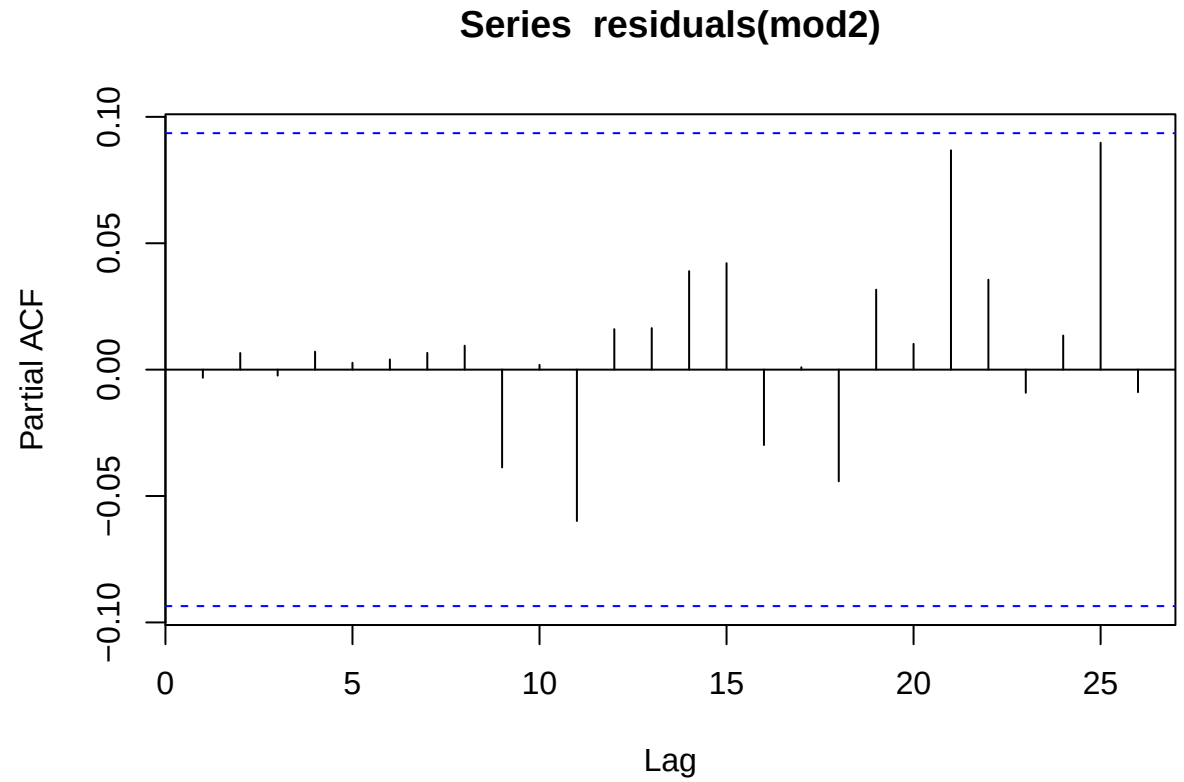
```
residuals_mod1 <- residuals(mod1)
lags <- c(6, 12, 18, 24)
test_results <- lapply(lags, function(lag) {
  Box.test(residuals_mod1, lag=lag, type="Ljung-Box")
})

p_values <- sapply(test_results, function(x) x$p.value)
diag_table <- data.frame(Lag = lags, P_Value = p_values)

print(diag_table, digits = 16)
```

```
##   Lag            P_Value
## 1   6 0.9998913941113833
## 2  12 0.9976106749924105
## 3  18 0.9982709653174110
## 4  24 0.9941040949439239
```

```
mod2= arima(data, order = c(8, 0, 0))
acf(residuals(mod2))
```




```
pacf(residuals(mod2))
```




```
print(AIC(mod2))
```

```
## [1] 2687.681
```

```r
print(BIC(mod2))
```

```
## [1] 2728.526
```

```r
residuals_mod2 <- residuals(mod2)
lags <- c(6, 12, 18, 24)
test_results <- lapply(lags, function(lag) {
  Box.test(residuals_mod2, lag=lag, type="Ljung-Box")
})

p_values <- sapply(test_results, function(x) x$p.value)
diag_table <- data.frame(Lag = lags, P_Value = p_values)

print(diag_table, digits = 16)
```

```
##   Lag            P_Value
## 1   6 0.9999956322534601
## 2  12 0.9979280963800142
## 3  18 0.9981941653470499
## 4  24 0.9944209179988882
```