HW 4

2022-09-30

```
library(fpp)
```

```
## Loading required package: forecast
```

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

```
## Loading required package: fma
```

```
## Loading required package: expsmooth
```

```
## Loading required package: lmtest
```

```
## Loading required package: zoo
```

```
##
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric
```

```
## Loading required package: tseries
```

```
library(fpp2)
```

```
## -- Attaching packages --------------------------------------------- fpp2 2.4 --
```

```
## v ggplot2 3.3.6
```

```
##
```

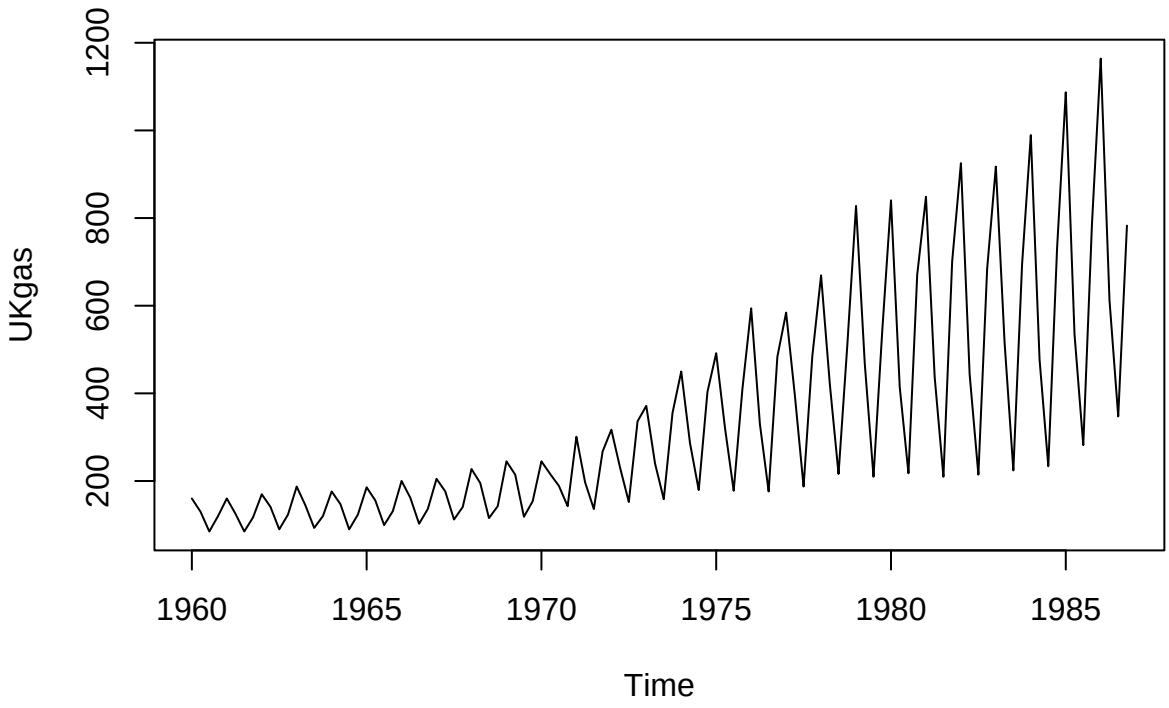
```
##
## Attaching package: 'fpp2'
```

```
## The following objects are masked from 'package:fpp':
##
##     ausair, ausbeer, austa, austourists, debitcards, departures,
##     elecequip, euretail, guinearice, oil, sunspotarea, usmelec
```

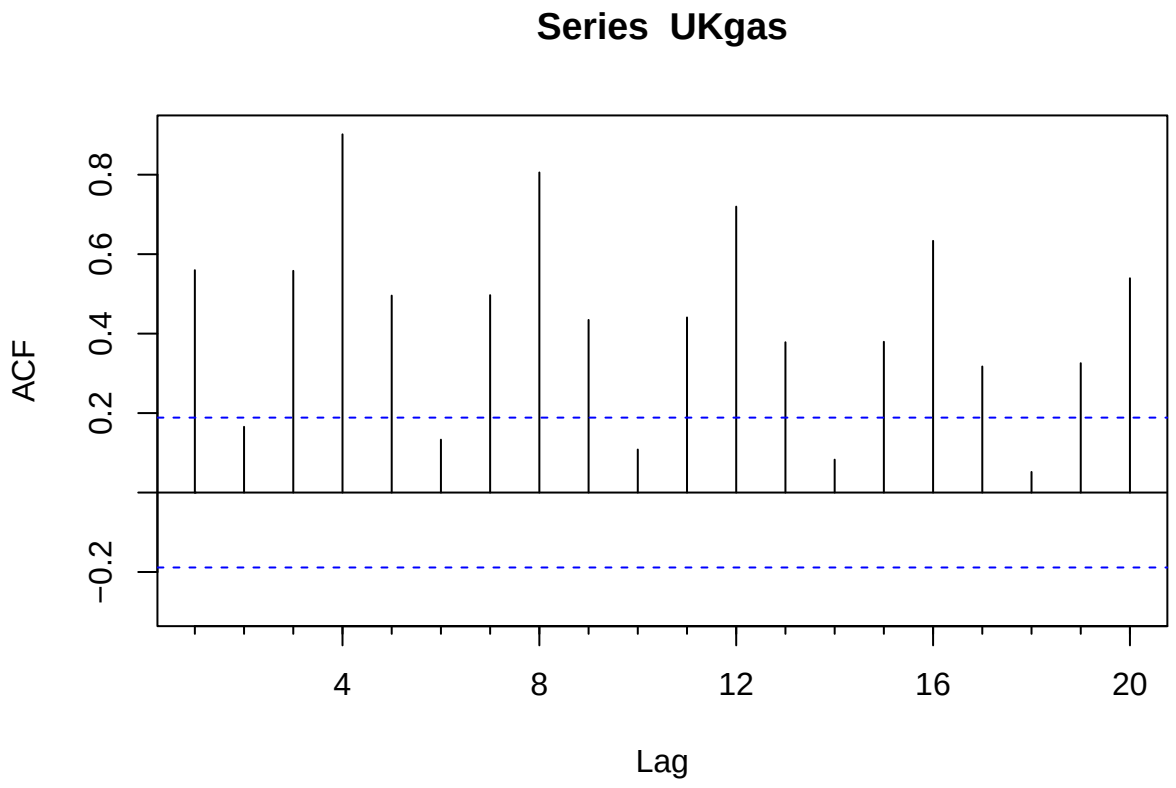
```
library(TTR)

attributes(UKgas)
```

```
## $tsp
## [1] 1960.00 1986.75    4.00
##
## $class
## [1] "ts"
```

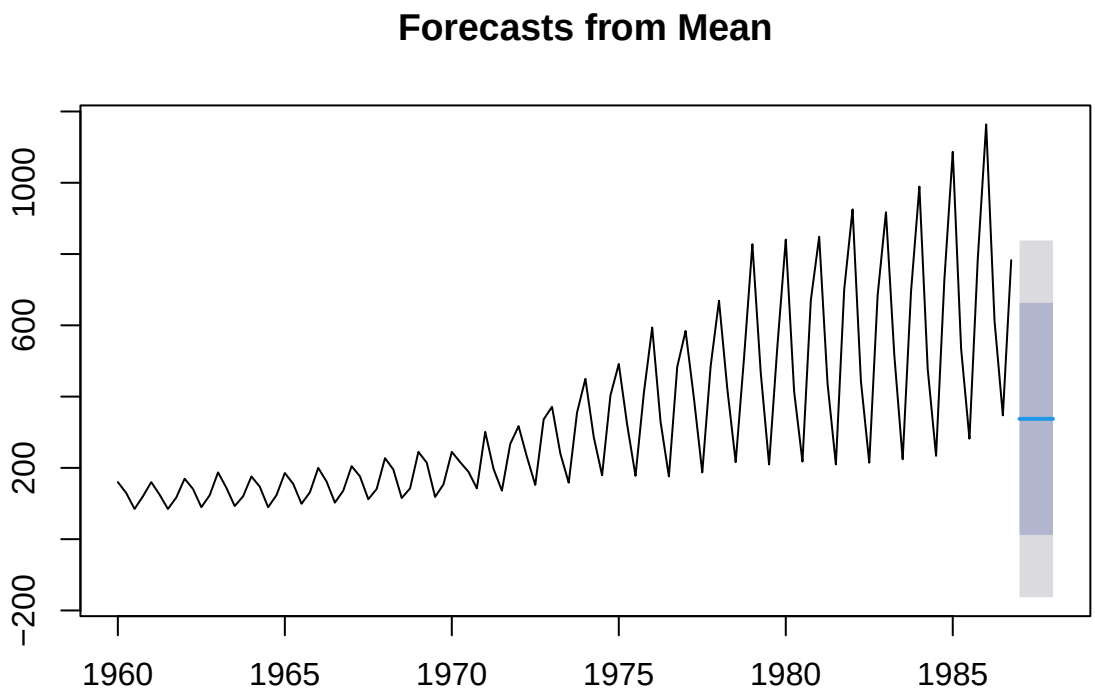
```
plot(UKgas)
```



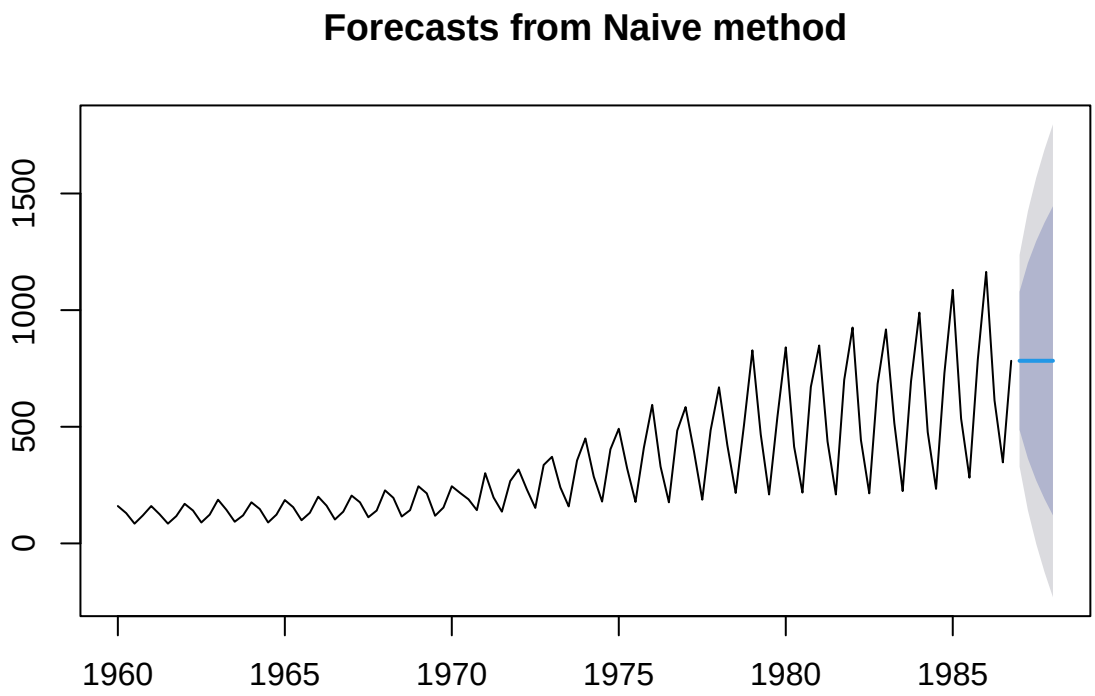

```
Acf(UKgas)
```



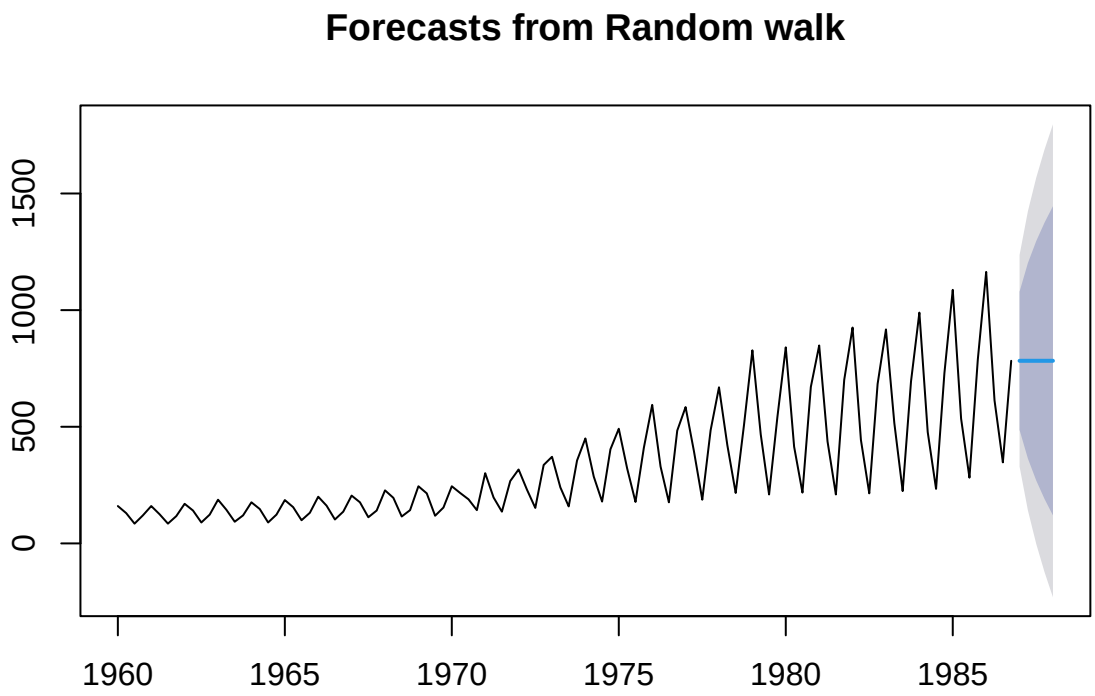

```
mean_forecast <-meanf(UKgas,5)
plot(mean_forecast)
```



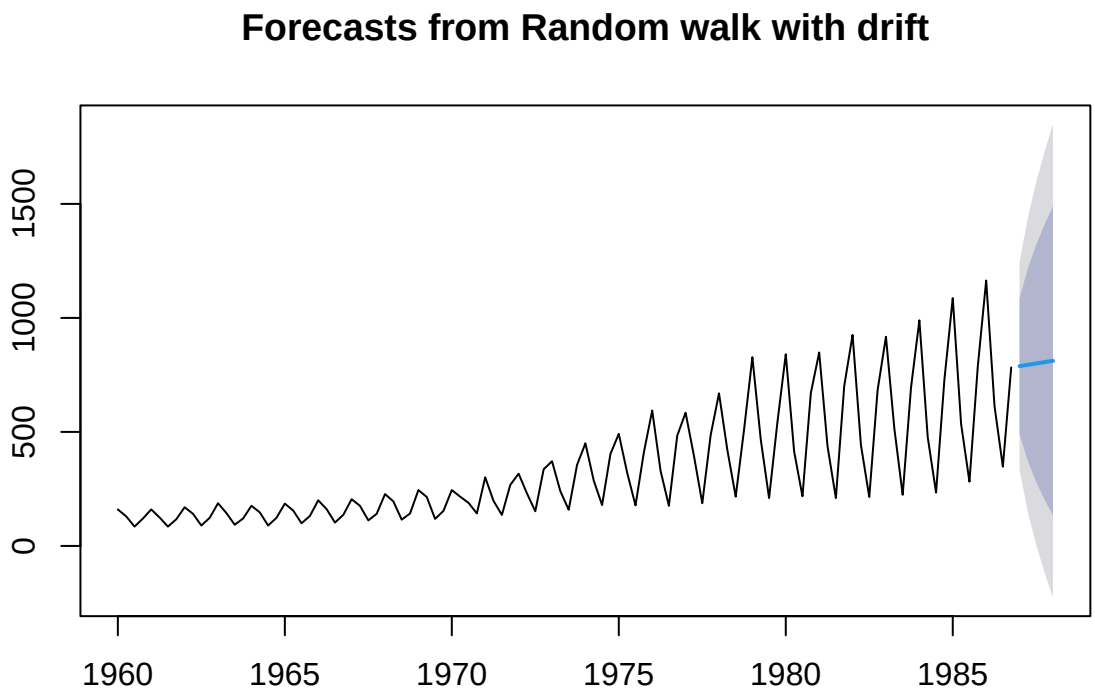

```
naive_forecast <- naive(UKgas, 5)
plot(naive_forecast)
```



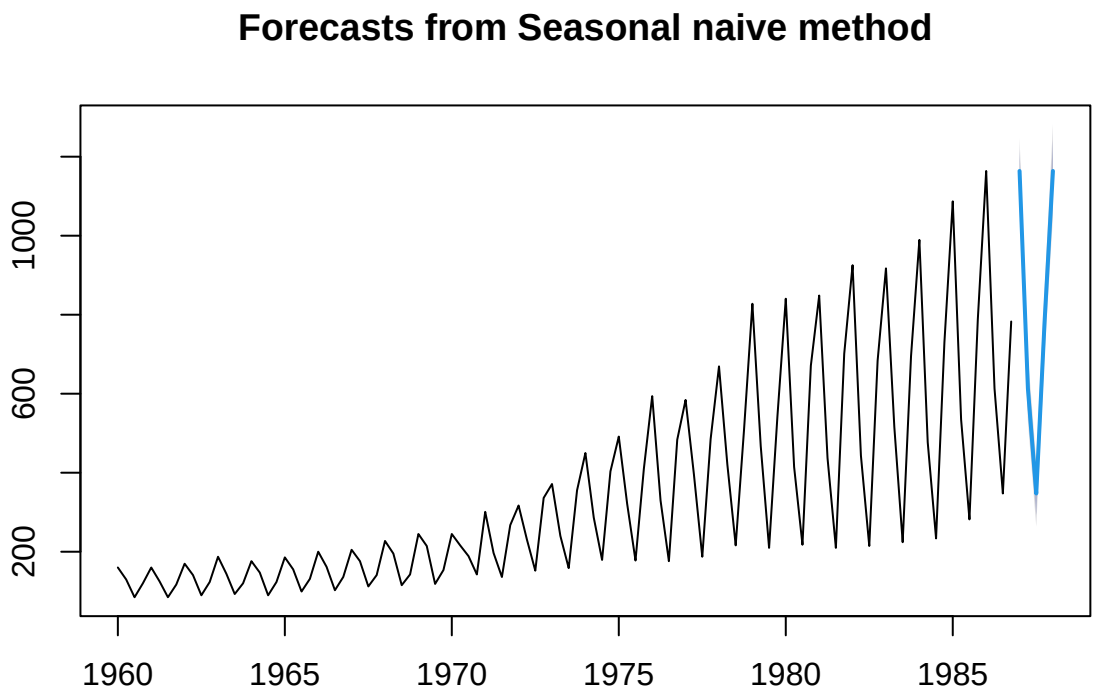

```
rwf_forecast1 <- rwf(UKgas, 5)
plot(rwf_forecast1)
```



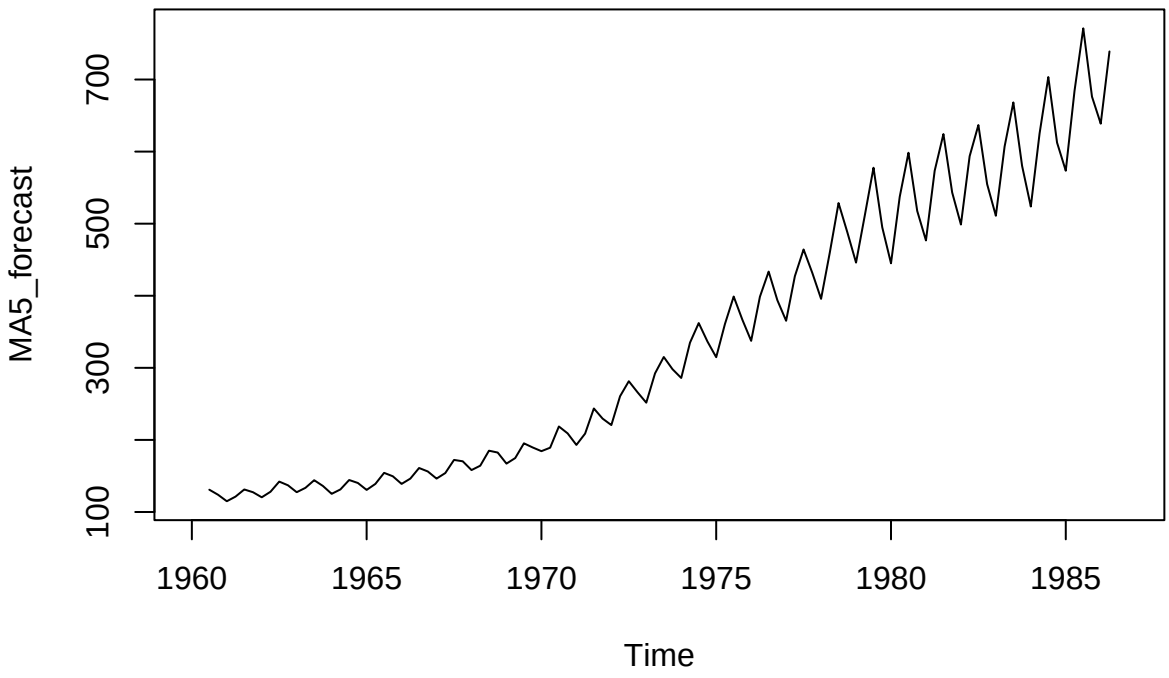

```
rwf_forecast2 <- rwf(UKgas, 5, drift=TRUE)
plot(rwf_forecast2)
```



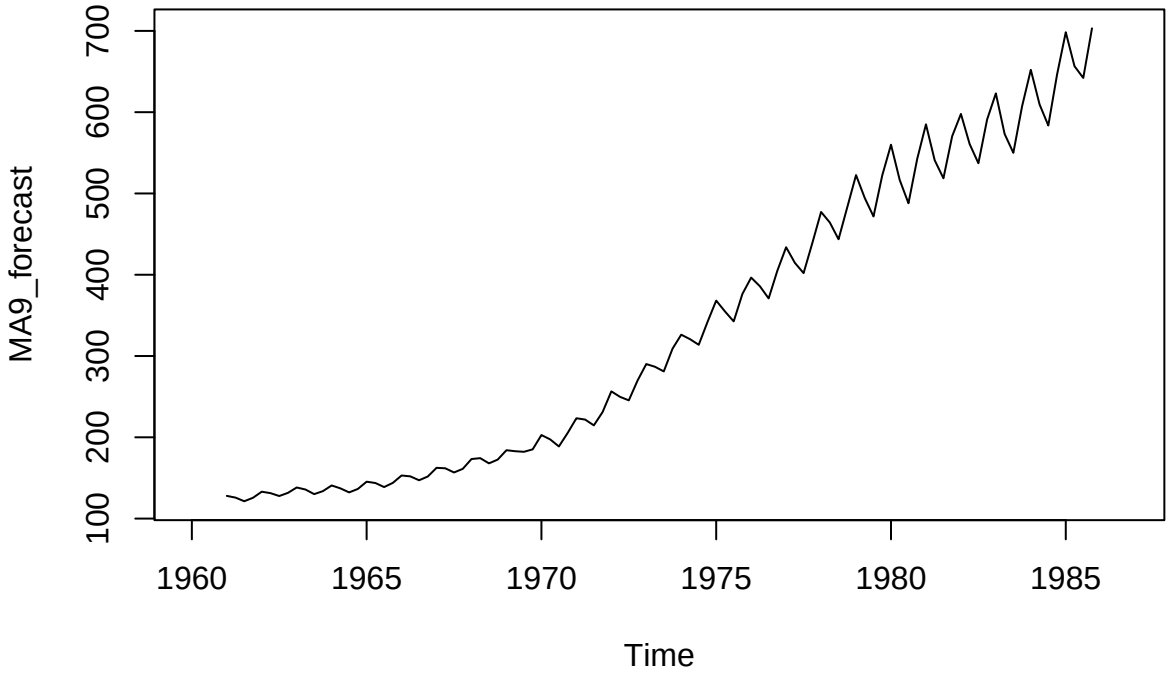

```
snaive_forecast <- snaive(UKgas, 5)
plot(snaive_forecast)
```



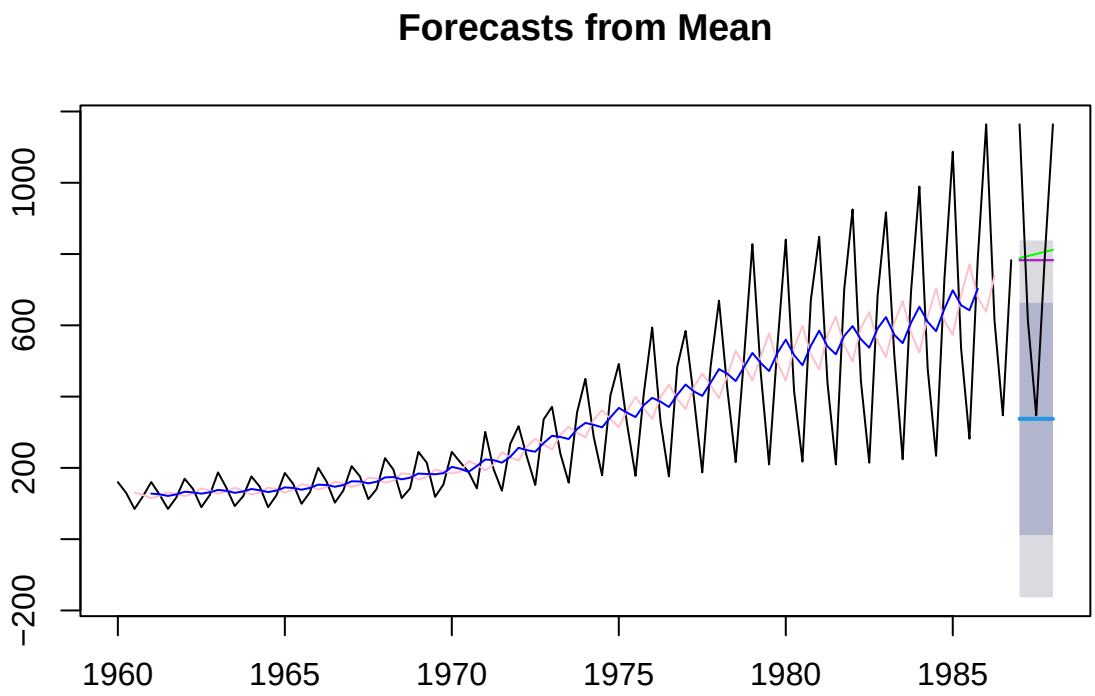

```
MA5_forecast <- ma(UKgas, order=5)
MA9_forecast <- ma(UKgas, order=9)
plot(MA5_forecast)
```




```
plot(MA9_forecast)
```



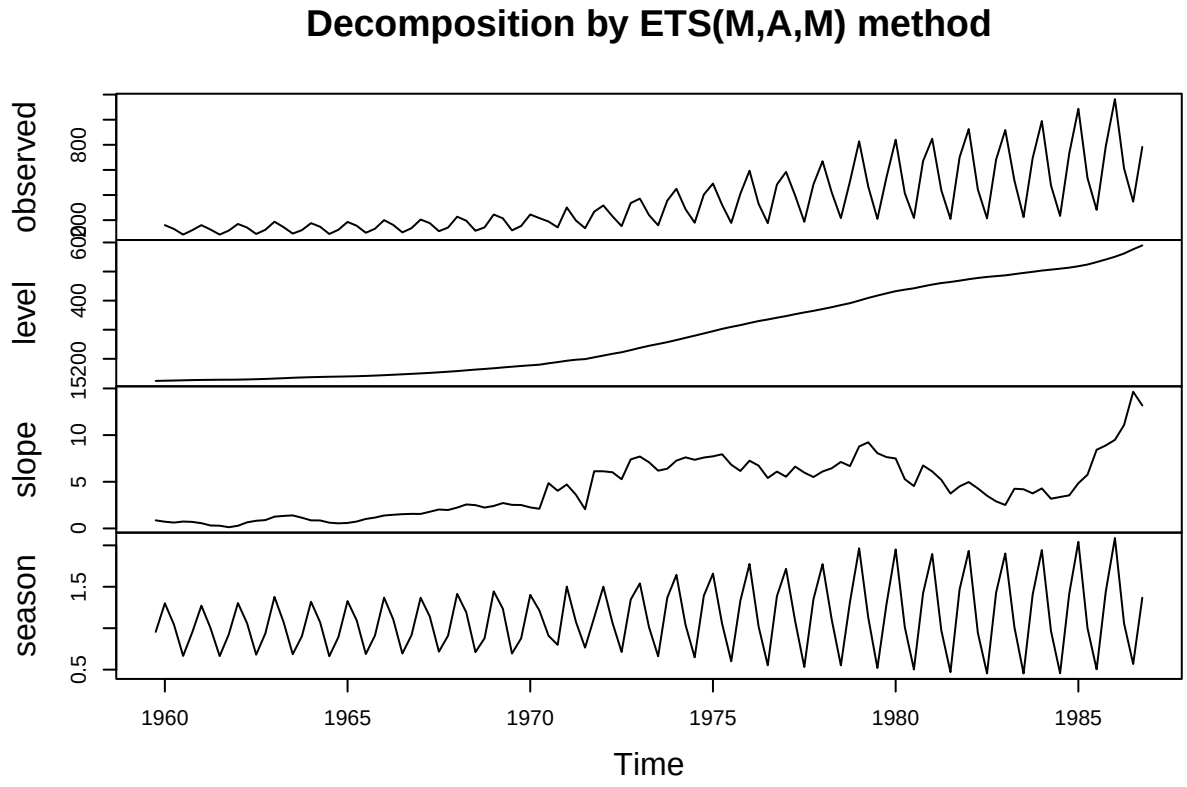

```
plot(mean_forecast)
lines(naive_forecast$mean,col="red")
lines(rwf_forecast2$mean,col="green")
lines(rwf_forecast1$mean,col="purple")
lines(snaive_forecast$mean,col="black")
lines(MA5_forecast,col="Pink")
lines(MA9_forecast,col="Blue")
```




```
attributes(naive_forecast)
```

```
## $names
##  [1] "method"    "model"     "lambda"    "x"         "fitted"    "residuals"
##  [7] "series"    "mean"      "level"     "lower"     "upper"
##
## $class
## [1] "forecast"
```

```
ets_forecast <- ets(UKgas)
plot(ets_forecast)
```



You can also embed plots, for example:

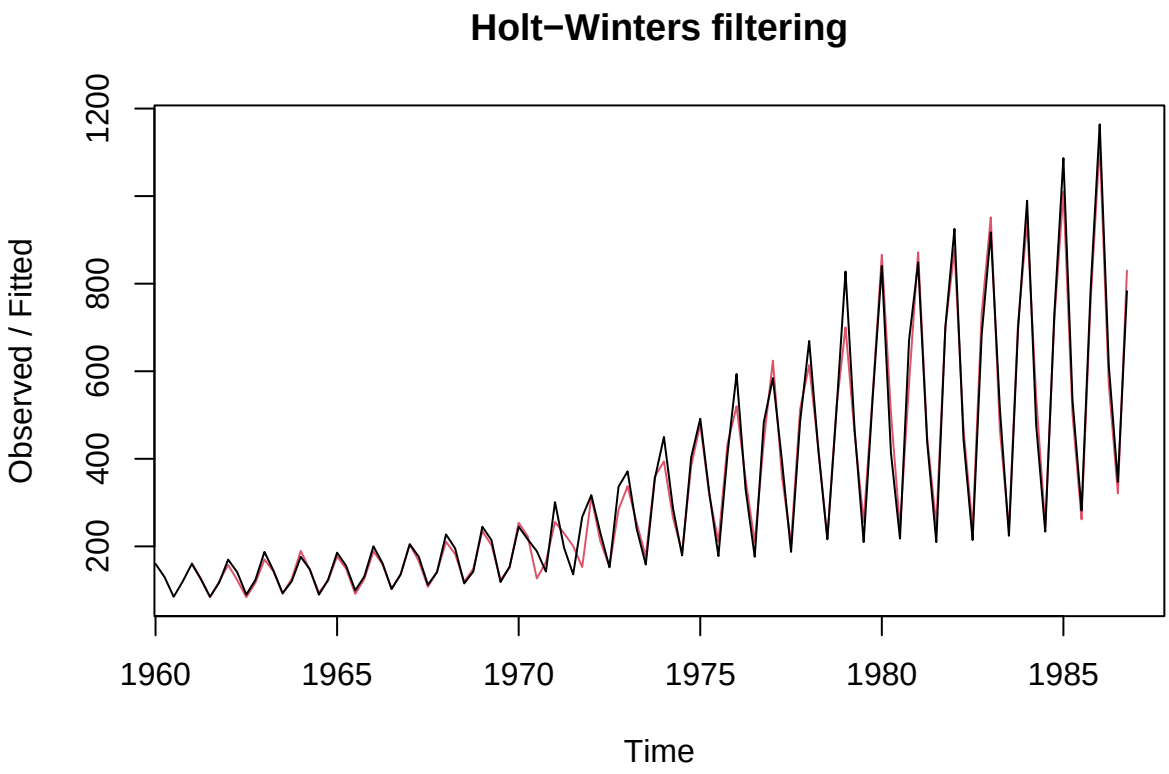
```
attributes(ets_forecast)
```

```
## $names
##  [1] "loglik"     "aic"        "bic"        "aicc"       "mse"
##  [6] "amse"       "fit"        "residuals"  "fitted"     "states"
## [11] "par"        "m"          "method"     "series"     "components"
## [16] "call"       "initstate"  "sigma2"     "x"
##
## $class
## [1] "ets"
```

```
ets_forecast$mse
```

```
## [1] 1034.411
```

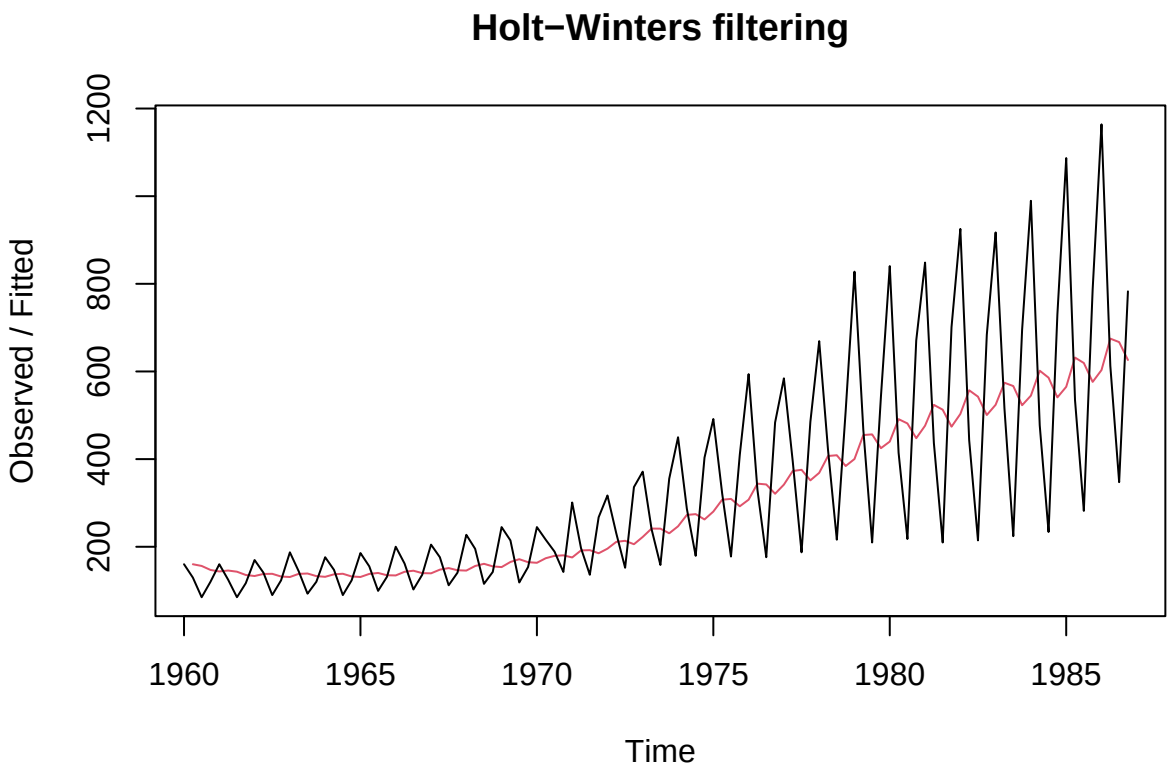
```
HW_forecast <- HoltWinters(UKgas)
plot(HW_forecast)
```




```
SSE_Simple <- HoltWinters(UKgas, beta = FALSE, gamma = FALSE )
attributes(SSE_Simple)
```

```
## $names
## [1] "fitted"       "x"            "alpha"        "beta"         "gamma"
## [6] "coefficients" "seasonal"     "SSE"          "call"
##
## $class
## [1] "HoltWinters"
```

```
plot(SSE_Simple)
```



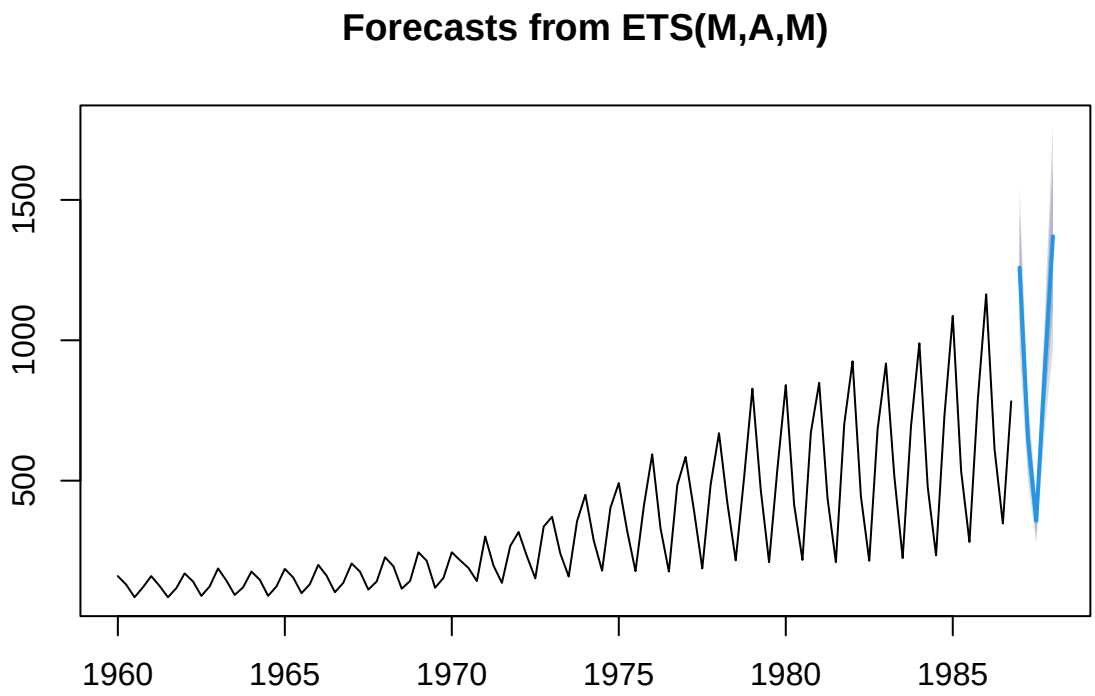

```
SSE_Simple$SSE
```

```
## [1] 3450731
```

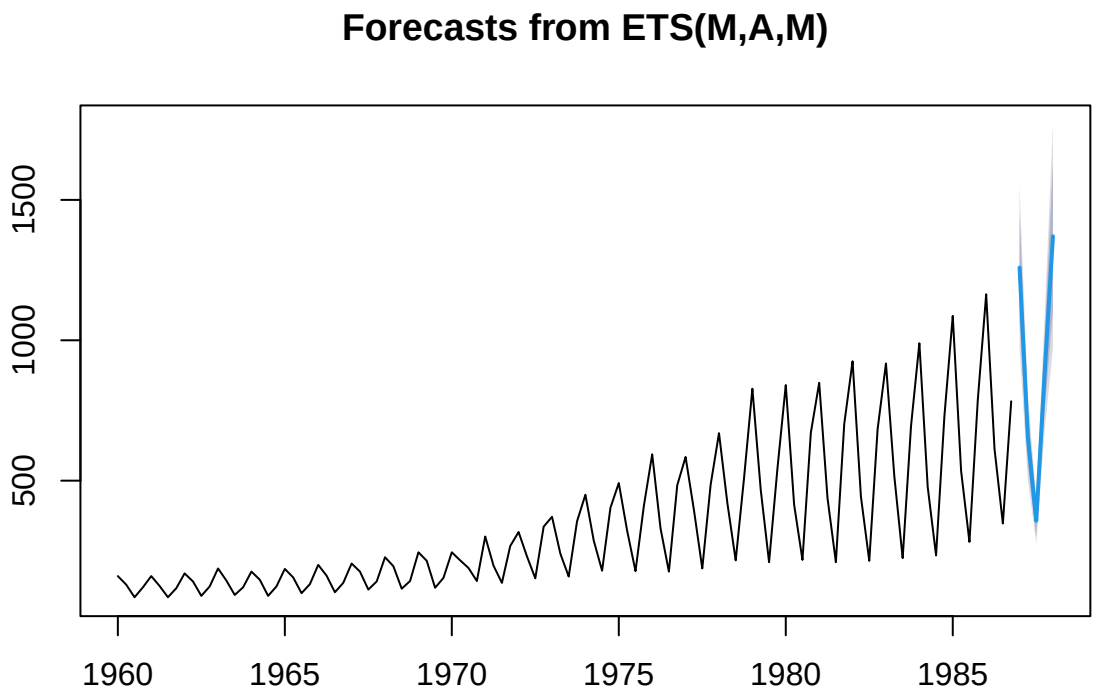
```
head(SSE_Simple$fitted)
```

```
##             xhat    level
## 1960 Q2 160.1000 160.1000
## 1960 Q3 156.2124 156.2124
## 1960 Q4 147.0800 147.0800
## 1961 Q1 143.6298 143.6298
## 1961 Q2 145.7360 145.7360
## 1961 Q3 143.0715 143.0715
```

```
forecast_ets_1 <-forecast.ets(ets_forecast, h=5)
plot(forecast_ets_1)
```




```
forecast_ets_2 <-forecast(ets_forecast, h=5)
plot(forecast_ets_2)
```


Forecasts from ETS(M,A,M)
500
1000
1500
1960
1965
1970
1975
1980
1985