

hw5

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Import the necessary libraries

```
library(forecast)#Source of gold dataset
```

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

```
library(tryCatchLog)
```

```
## futile.logger not found. Using tryCatchLog-internal functions for logging...
```

```
library(attempt)  
library(TTR)
```

Daily morning gold prices in US dollars. 1 January 1985 – 31 March 1989.

```
data("gold")
```

The classic Box & Jenkins airline data. Monthly totals of international airline passengers, 1949 to 1960 from base-R datasets. Monthly data.

```
data(AirPassengers)
```

A time series object containing average air temperatures at Nottingham Castle in degrees Fahrenheit for 20 years.(1920-1939)

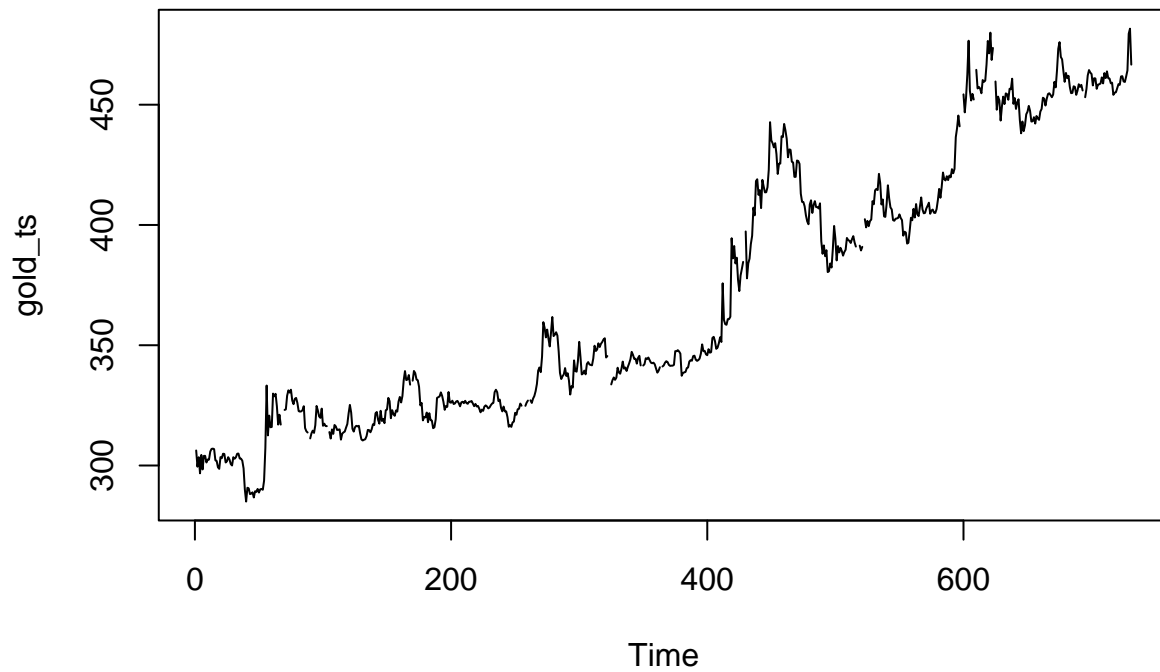
```
data(nottem)
```

Create time series objects from data

```
gold_ts <- ts(gold, start=1, end = 731) #January 1st 1985- Jan 1st 1987 subset  
air_pass_ts <- AirPassengers  
nottem_ts <- ts(nottem)
```

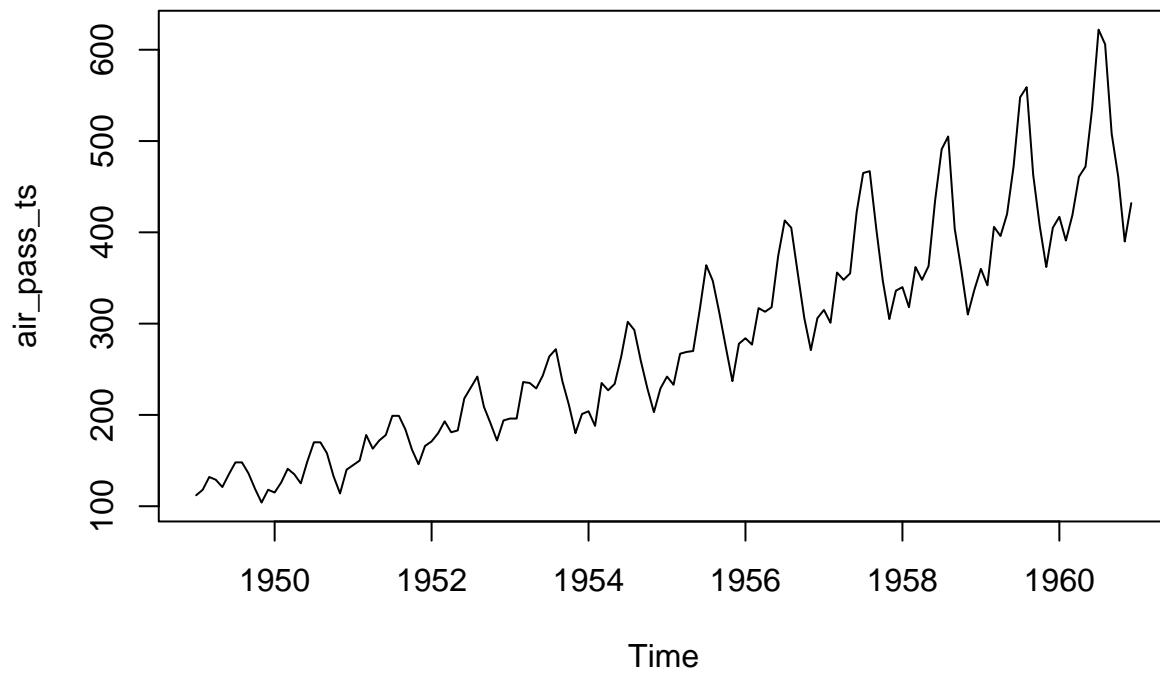
Plot gold time series

```
plot.ts(gold_ts)
```



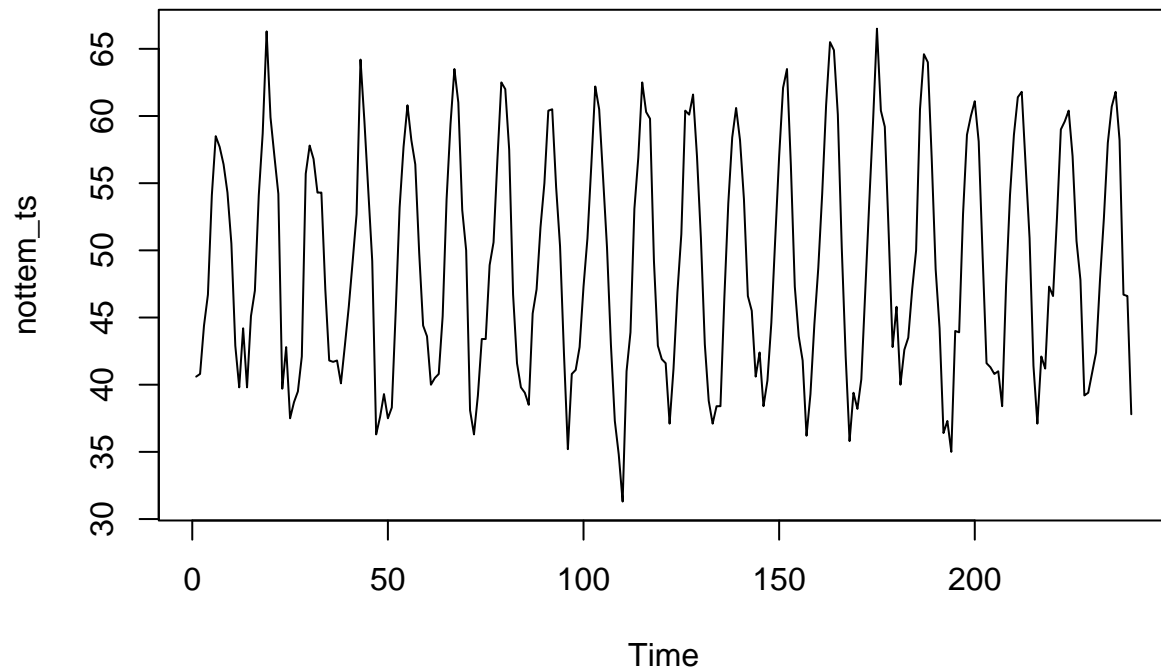
Plot Air Passengers time series

```
plot.ts(air_pass_ts)
```



Plot nottem time series

```
plot.ts(nottem_ts)
```



composing Gold time series. Impossible, so there is no seasonal component

```
tryCatch(decomposed_gold_additive <- decompose(gold_ts, type='additive'), .e=~print("Cannot decompose additive gold"))
```

```
## [1] "Cannot decompose additive gold"
```

```
tryCatch(decomposed_gold_mult <- decompose(gold_ts, type='multiplicative'), .e=~print("Cannot decompose multiplicative gold"))
```

```
## [1] "Cannot decompose multiplicative gold"
```

Instead, let us try to use SMA for Gold data.

```
tryCatch(sma_gold <- SMA(gold_ts), .e=~print("Cannot get moving average gold"))
```

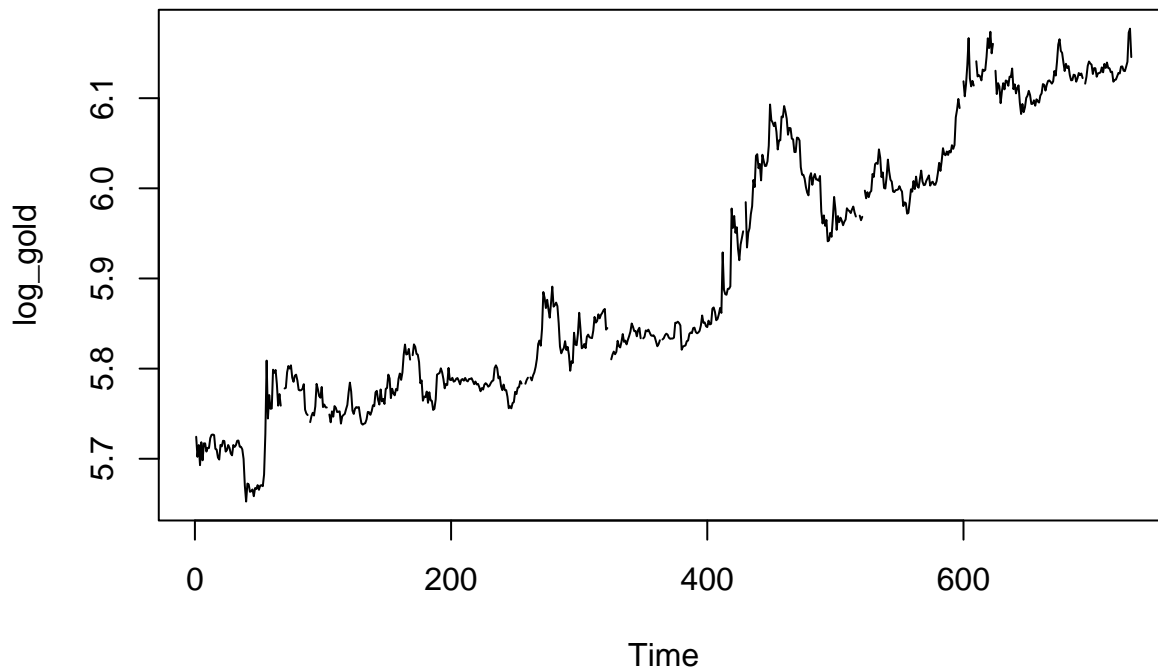
```
## [1] "Cannot get moving average gold"
```

We can now try exponential smoothing on gold data

```
log_gold <- log(gold_ts)
```

```
#Now that we have taken the log, let's try to fit a linear model
```

```
plot.ts(log_gold)
```



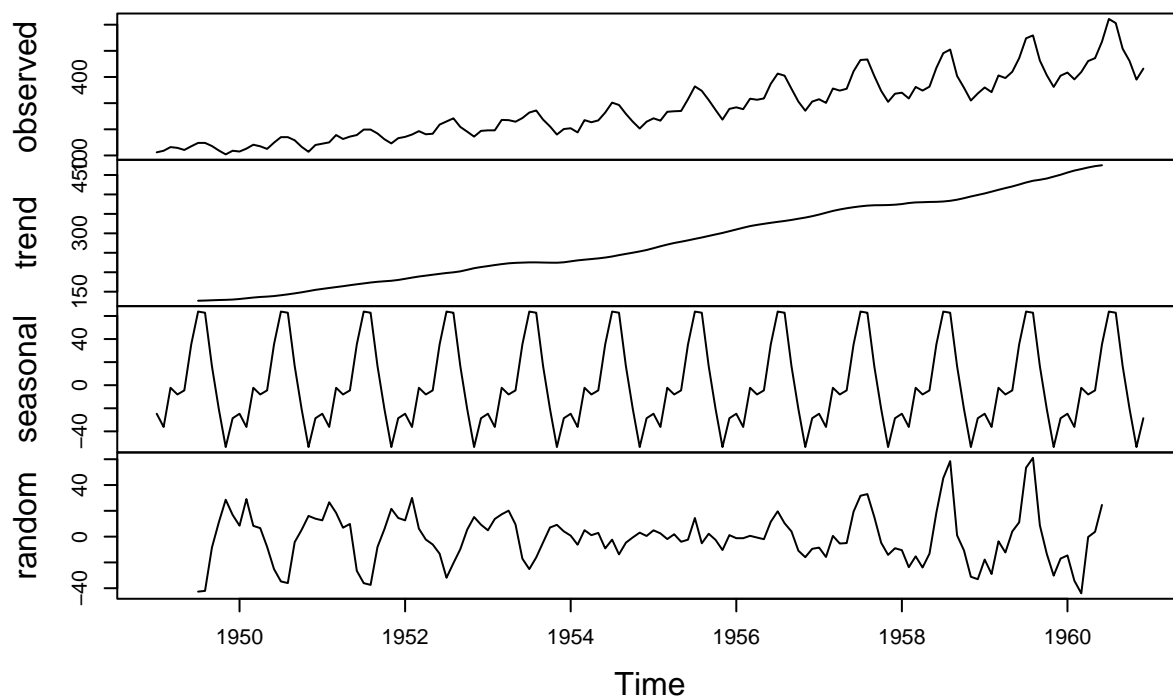
Decomposing Airpassenger time series. Successful

```
try_catch(decomposed_air_pass_additive <- decompose(air_pass_ts, type='additive'), .e=~print("Cannot de
try_catch(decomposed_air_pass_mult <- decompose(air_pass_ts, type='multiplicative'), .e=~print("Cannot o
```

Since Airpassenger decomposition was successful, let us plot the decomposed version. We see that both plots are successful.

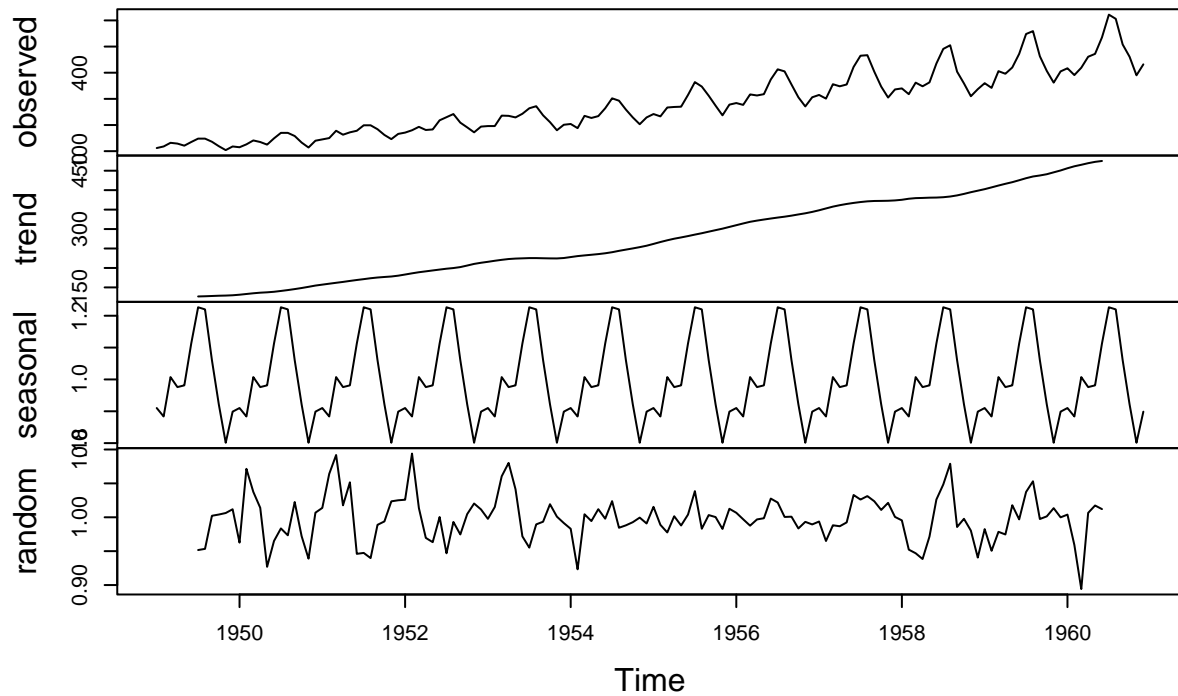
```
plot(decomposed_air_pass_additive)
```

Decomposition of additive time series



```
plot(decomposed_air_pass_mult)
```

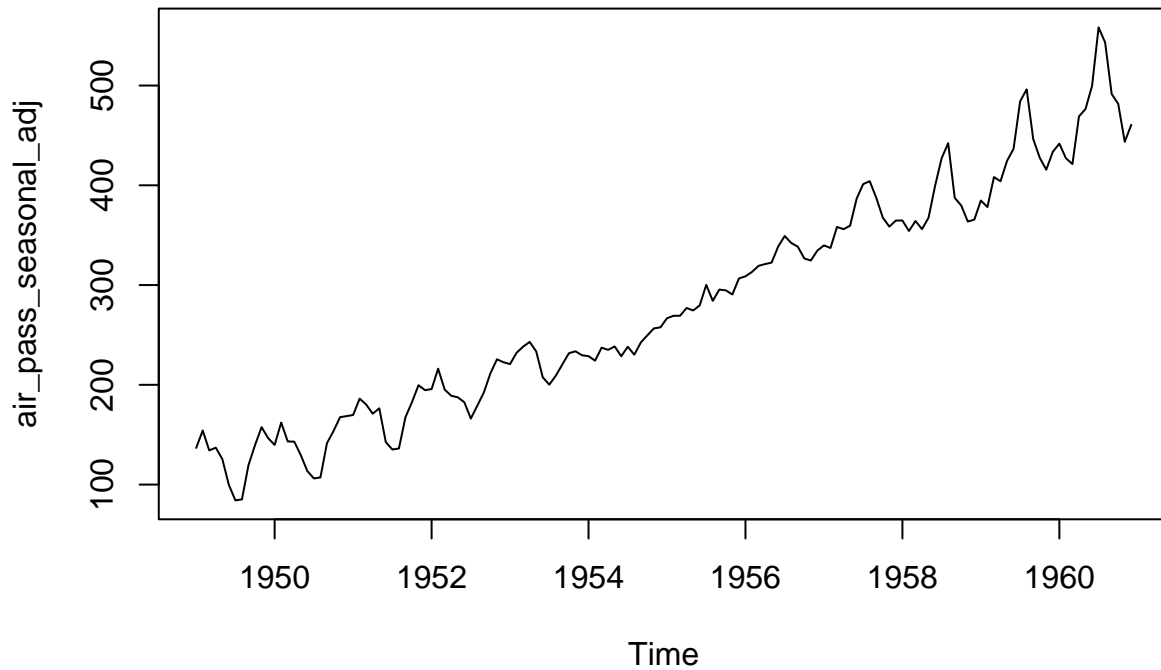
Decomposition of multiplicative time series



Let

us now try seasonal adjustment for AirPassengers

```
air_pass_seasonal_adj <- air_pass_ts - decomposed_air_pass_additive$seasonal
plot(air_pass_seasonal_adj)
```



Decomposing Notttem time series.Impossible

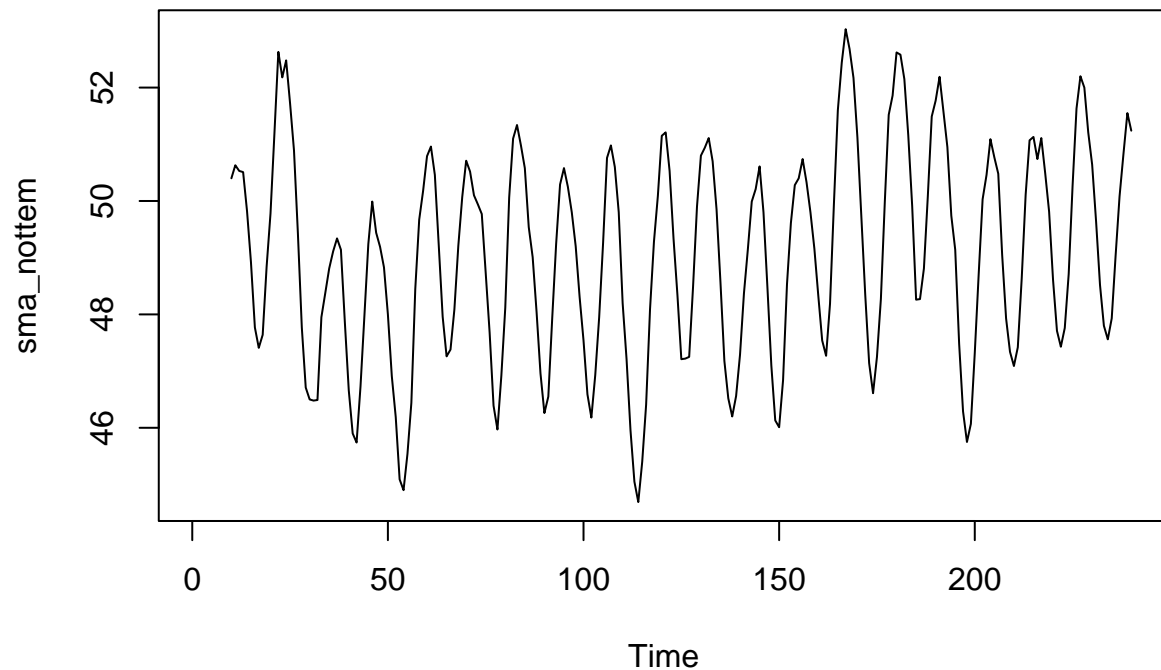
```
tryCatch(decomposed_nottem_additive <- decompose(nottem_ts, type='additive'), .e=~print("Cannot decompose additive nottem"))
## [1] "Cannot decompose additive nottem"
tryCatch(decomposed_nottem_mult <- decompose(nottem_ts, type='multiplicative'), .e=~print("Cannot decompose multiplicative nottem"))
## [1] "Cannot decompose multiplicative nottem"
```

Instead, let us try to use SMA for Nottem data

```
tryCatch(sma_nottem <- SMA(nottem_ts), .e=~print("Cannot get moving average SMA"))
```

Since no error was generated, we can plot sma_nottem

```
plot.ts(sma_nottem)
```



Observations and Conclusions

In the subset of data taken from the gold prices dataset, the price of Gold is increasing. That is not the case for the entire dataset. Neither Gold nor nottem data are additive models which is why `decompose()` does not work for them.

However, Air passengers is additive and multiplicative as both decompositions are possible. There is a clear upward trend; As time increases, the number of passengers increases. For nottem data, we were able to compute the moving average using `SMA()`.