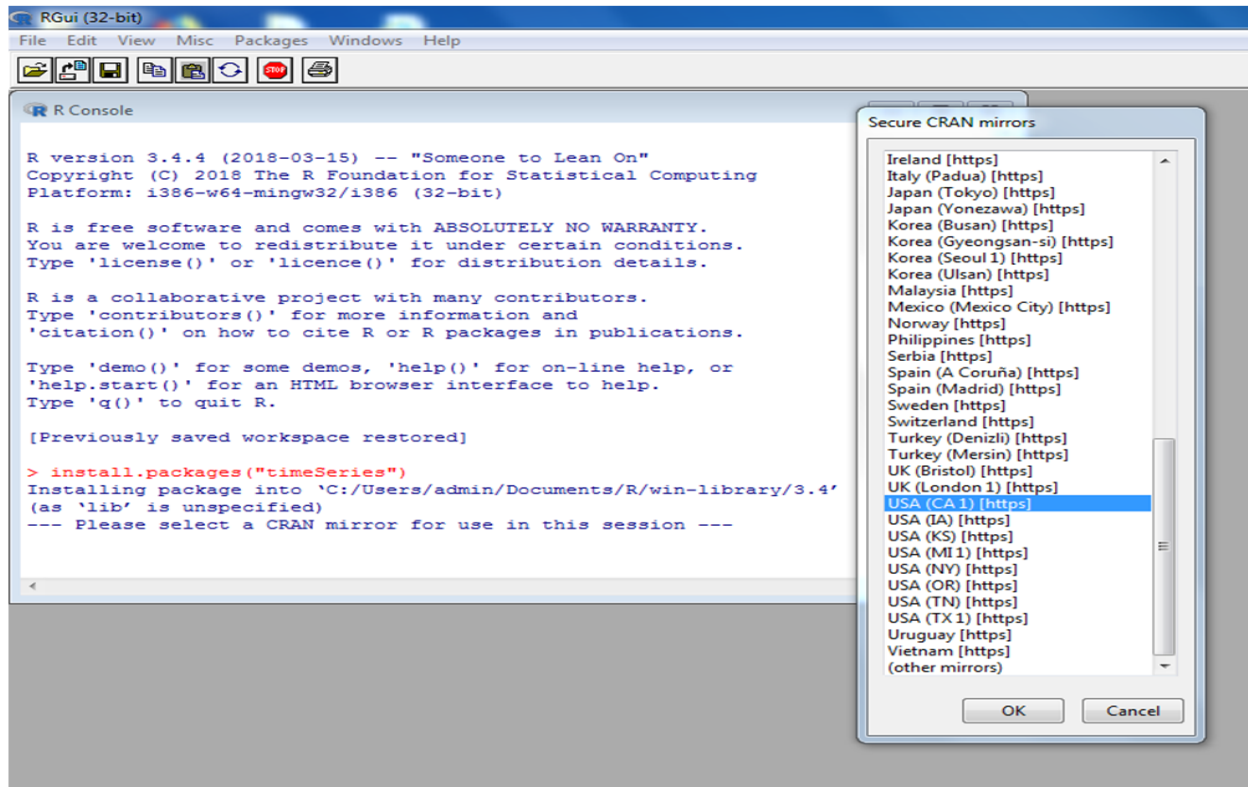


Practical No 9

Aim: Demonstration of Time-series forecasting.

STEP 1: Install time series

`install.packages("timeSeries")`



Step 2: Install package forecast

`install.packages("forecast")`

```

RGui (32-bit)
File Edit View Misc Packages Windows Help

R Console

> install.packages("timeSeries")
Installing package into 'C:/Users/admin/Documents/R/win-library/3.4'
(as 'lib' is unspecified)
--- Please select a CRAN mirror for use in this session ---
trying URL 'https://cran.cnr.berkeley.edu/bin/windows/contrib/3.4/timeSeries_30$
Content type 'application/zip' length 1617359 bytes (1.5 MB)
downloaded 1.5 MB

package 'timeSeries' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
C:\Users\admin\AppData\Local\Temp\RtmpENyNhK\downloaded_packages
> install.packages("forecast")
Installing package into 'C:/Users/admin/Documents/R/win-library/3.4'
(as 'lib' is unspecified)
trying URL 'https://cran.cnr.berkeley.edu/bin/windows/contrib/3.4/forecast_8.4.$
Content type 'application/zip' length 1996309 bytes (1.9 MB)
downloaded 1.9 MB

package 'forecast' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
C:\Users\admin\AppData\Local\Temp\RtmpENyNhK\downloaded_packages
> |

```

```
data1=table(AirPassengers)
```

```
Data1
```

```
view(data1)
```

```

> data1
AirPassengers
104 112 114 115 118 119 121 125 126 129 132 133 135 136 140 141 145 146 148 149
  1  1  1  1  2  1  1  1  1  1  1  1  2  1  1  1  1  1  2  1
150 158 162 163 166 170 171 172 178 180 181 183 184 188 191 193 194 196 199 201
  1  1  1  1  1  2  1  2  2  2  1  1  1  1  1  1  1  2  2  1
203 204 209 211 218 227 229 230 233 234 235 236 237 242 243 259 264 267 269 270
  1  1  1  1  1  1  3  1  1  1  2  1  2  2  1  1  2  1  1  1
271 272 274 277 278 284 293 301 302 305 306 310 312 313 315 317 318 336 337 340
  1  1  1  1  1  1  1  1  1  1  2  1  1  1  2  1  2  1  1  1
342 347 348 355 356 359 360 362 363 364 374 390 391 396 404 405 406 407 413 417
  1  2  2  2  1  1  1  2  1  1  1  1  1  1  2  2  1  1  1  1
419 420 422 432 435 461 463 465 467 472 491 505 508 535 548 559 606 622
  1  1  1  1  1  2  1  1  1  2  1  1  1  1  1  1  1  1
> View (data1)
> |

```

Step 3: library (timeSeries)

```
#library(forecast)
```

```
RGui (32-bit)
File Edit View Misc Packages Windows Help

R Console
Load workspace

> install.packages("timeSeries")
Installing package into 'C:/Users/admin/Documents/R/win-library/3.4'
(as 'lib' is unspecified)
--- Please select a CRAN mirror for use in this session ---
trying URL 'https://cran.cnr.berkeley.edu/bin/windows/contrib/3.4/timeSeries_30$
Content type 'application/zip' length 1617359 bytes (1.5 MB)
downloaded 1.5 MB

package 'timeSeries' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
  C:\Users\admin\AppData\Local\Temp\RtmpENyNhK\downloaded_packages
> install.packages("forecast")
Installing package into 'C:/Users/admin/Documents/R/win-library/3.4'
(as 'lib' is unspecified)
trying URL 'https://cran.cnr.berkeley.edu/bin/windows/contrib/3.4/forecast_8.4.$
Content type 'application/zip' length 1996309 bytes (1.9 MB)
downloaded 1.9 MB

package 'forecast' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
  C:\Users\admin\AppData\Local\Temp\RtmpENyNhK\downloaded_packages
> library(forecast)
> |
```

library(forecast)

```
RGui (32-bit)
File Edit View Misc Packages Windows Help

R Console
Load workspace

--- Please select a CRAN mirror for use in this session ---
trying URL 'https://cran.cnr.berkeley.edu/bin/windows/contrib/3.4/timeSeries_30$
Content type 'application/zip' length 1617359 bytes (1.5 MB)
downloaded 1.5 MB

package 'timeSeries' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
  C:\Users\admin\AppData\Local\Temp\RtmpENyNhK\downloaded_packages
> install.packages("forecast")
Installing package into 'C:/Users/admin/Documents/R/win-library/3.4'
(as 'lib' is unspecified)
trying URL 'https://cran.cnr.berkeley.edu/bin/windows/contrib/3.4/forecast_8.4.$
Content type 'application/zip' length 1996309 bytes (1.9 MB)
downloaded 1.9 MB

package 'forecast' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
  C:\Users\admin\AppData\Local\Temp\RtmpENyNhK\downloaded_packages
> library(forecast)
> library(timeSeries)
Loading required package: timeDate
> library(forecast)
> |
```

Step 5: Air Passengers data

```
data1=table(AirPassengers)
```

```
data1
```

The screenshot shows an R Console window with the following output:

```
Loading required package: timeDate
> library(forecast)
Error: package or namespace load failed for 'forecast' in loadNamespace(i, c(lib$
there is no package called 'Rcpp'
In addition: Warning message:
package 'forecast' was built under R
> data1=table(AirPassengers)
> data1
AirPassengers
104 112 114 115 118 119 121 125 126 1
1 1 1 1 2 1 1 1 1
150 158 162 163 166 170 171 172 178 1
1 1 1 1 1 2 1 2 2
203 204 209 211 218 227 229 230 233 2
1 1 1 1 1 1 3 1 1
271 272 274 277 278 284 293 301 302 3
1 1 1 1 1 1 1 1 1
342 347 348 355 356 359 360 362 363 3
1 2 2 2 1 1 1 2 1
419 420 422 432 435 461 463 465 467 4
1 1 1 1 1 2 1 1 1
> view(data1)
Error in view(data1) : could not find
> View(data1)
> |
```

The Data Viewer window shows the frequency table for data1:

	AirPassengers	Freq
1	104	1
2	112	1
3	114	1
4	115	1
5	118	2
6	119	1
7	121	1
8	125	1
9	126	1
10	129	1
11	132	1
12	133	1
13	135	2
14	136	1
15	140	1
16	141	1
17	145	1
18	146	1
19	148	2

Additional data values are visible on the right side of the Data Viewer window:

```
146 148 149
1 2 1
196 199 201
2 2 1
267 269 270
1 1 1
336 337 340
1 1 1
407 413 417
1 1 1
622
1
```

```
frequency (AirPassengers)
```

```
> frequency (AirPassengers)
[1] 12
> |
```

```
tsdata=ts(AirPassengers,frequency=12)
```

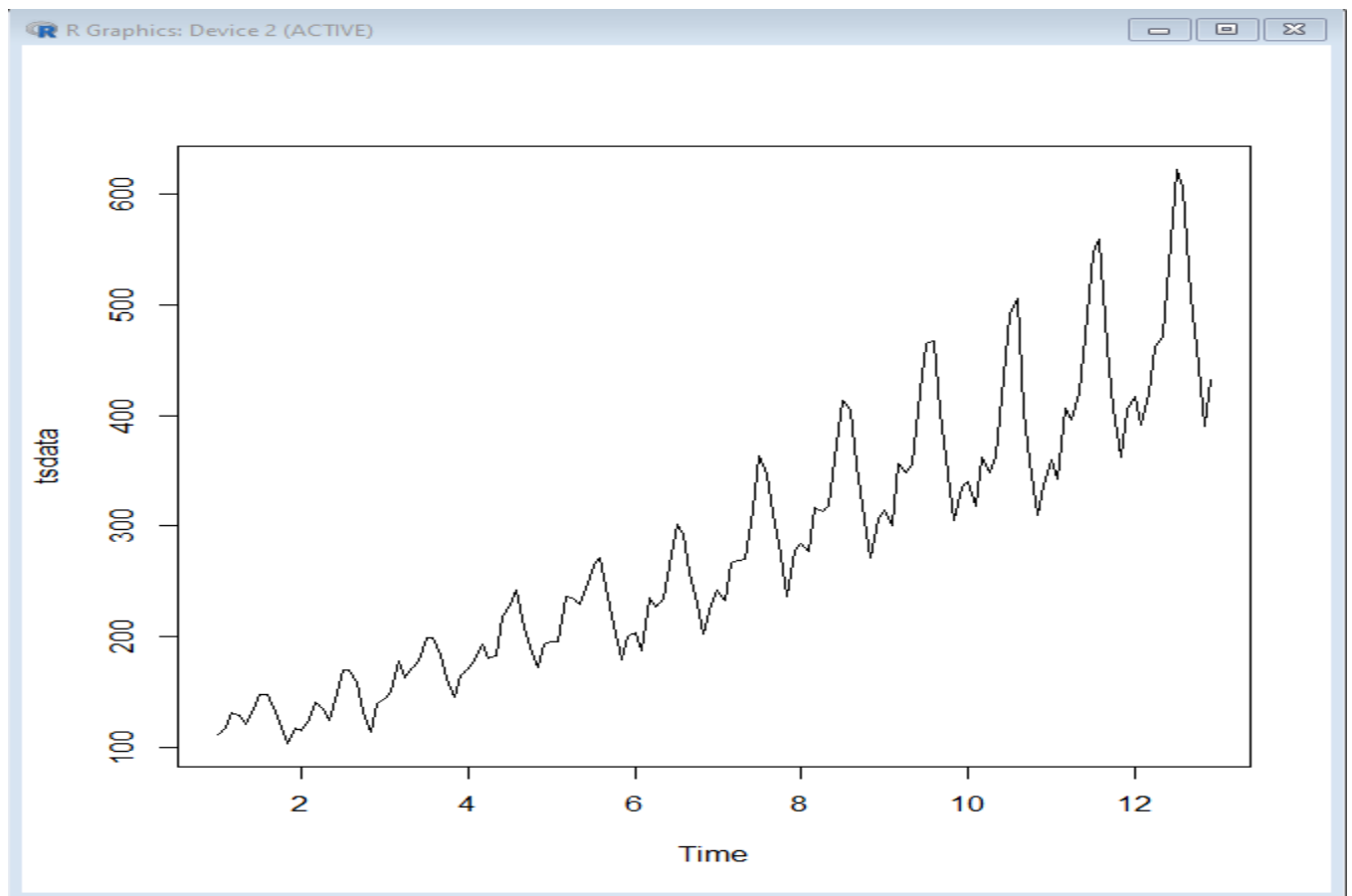
```
> tsdata
```

```

> tsdata=ts(AirPassengers,frequency=12)
> tsdata
      Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
1  112 118 132 129 121 135 148 148 136 119 104 118
2  115 126 141 135 125 149 170 170 158 133 114 140
3  145 150 178 163 172 178 199 199 184 162 146 166
4  171 180 193 181 183 218 230 242 209 191 172 194
5  196 196 236 235 229 243 264 272 237 211 180 201
6  204 188 235 227 234 264 302 293 259 229 203 229
7  242 233 267 269 270 315 364 347 312 274 237 278
8  284 277 317 313 318 374 413 405 355 306 271 306
9  315 301 356 348 355 422 465 467 404 347 305 336
10 340 318 362 348 363 435 491 505 404 359 310 337
11 360 342 406 396 420 472 548 559 463 407 362 405
12 417 391 419 461 472 535 622 606 508 461 390 432
>

```

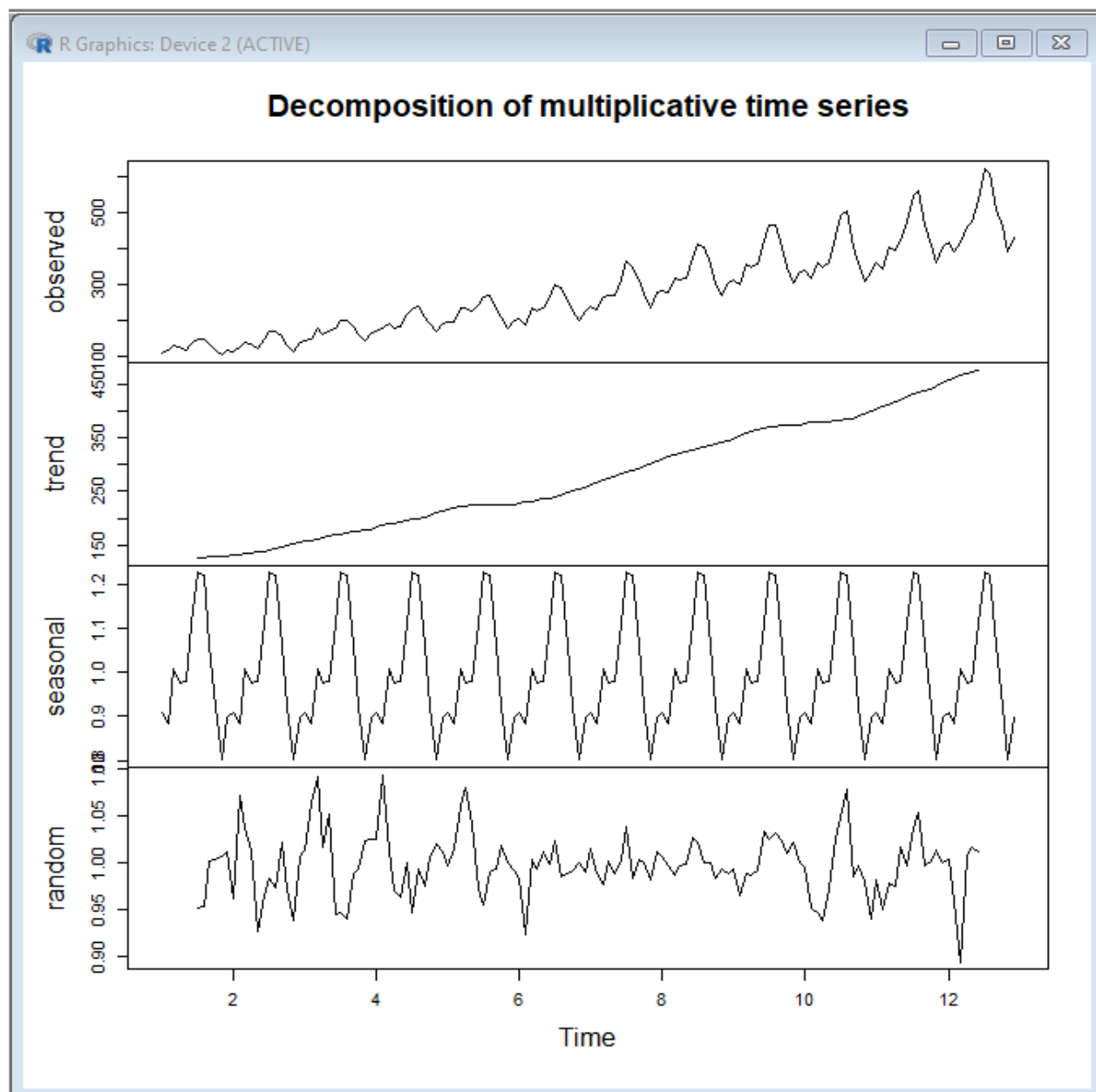
plot(tsdata)



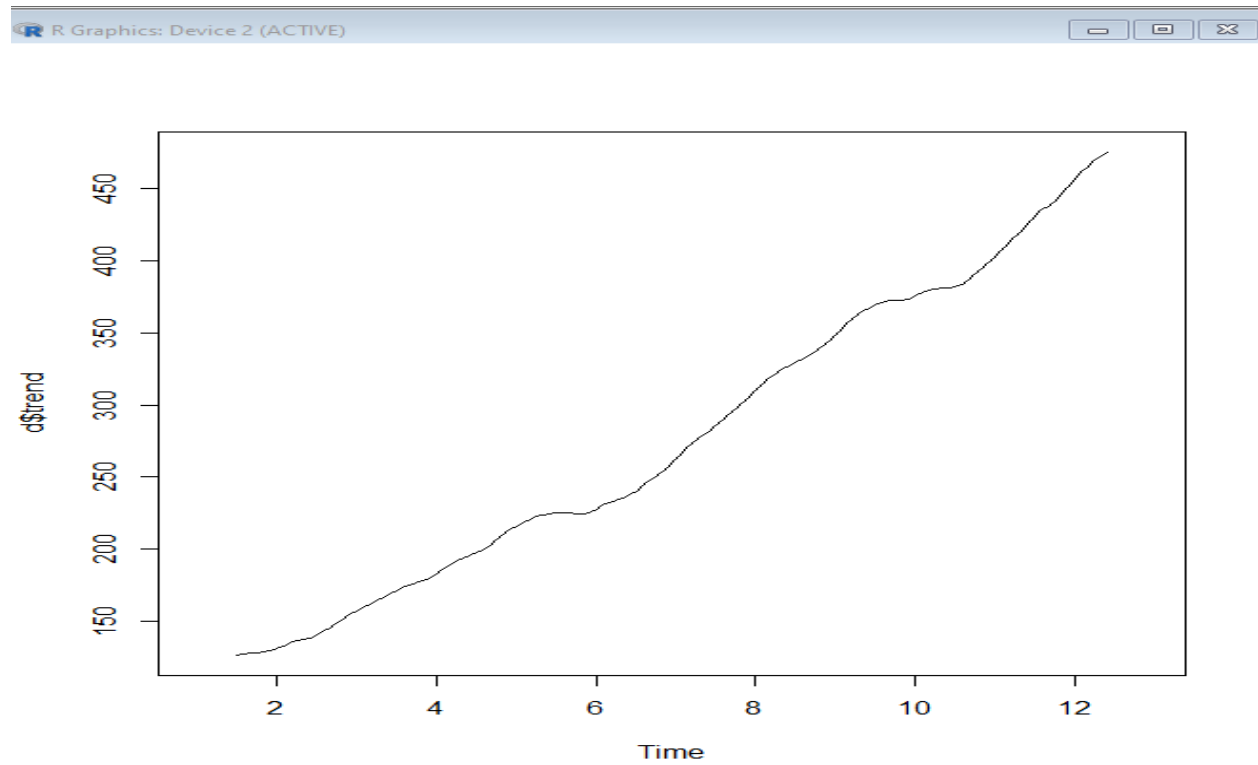
```

> d=decompose(tsdata,"multiplicative")
> plot(d)

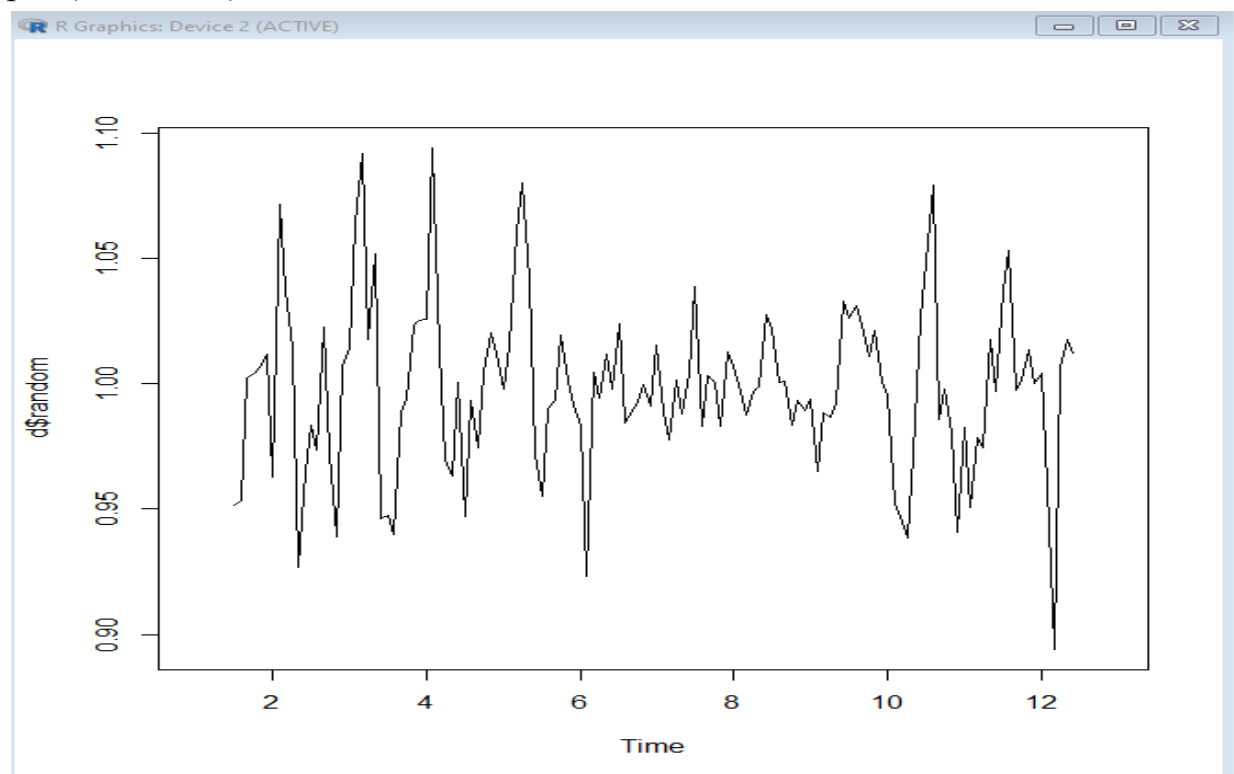
```



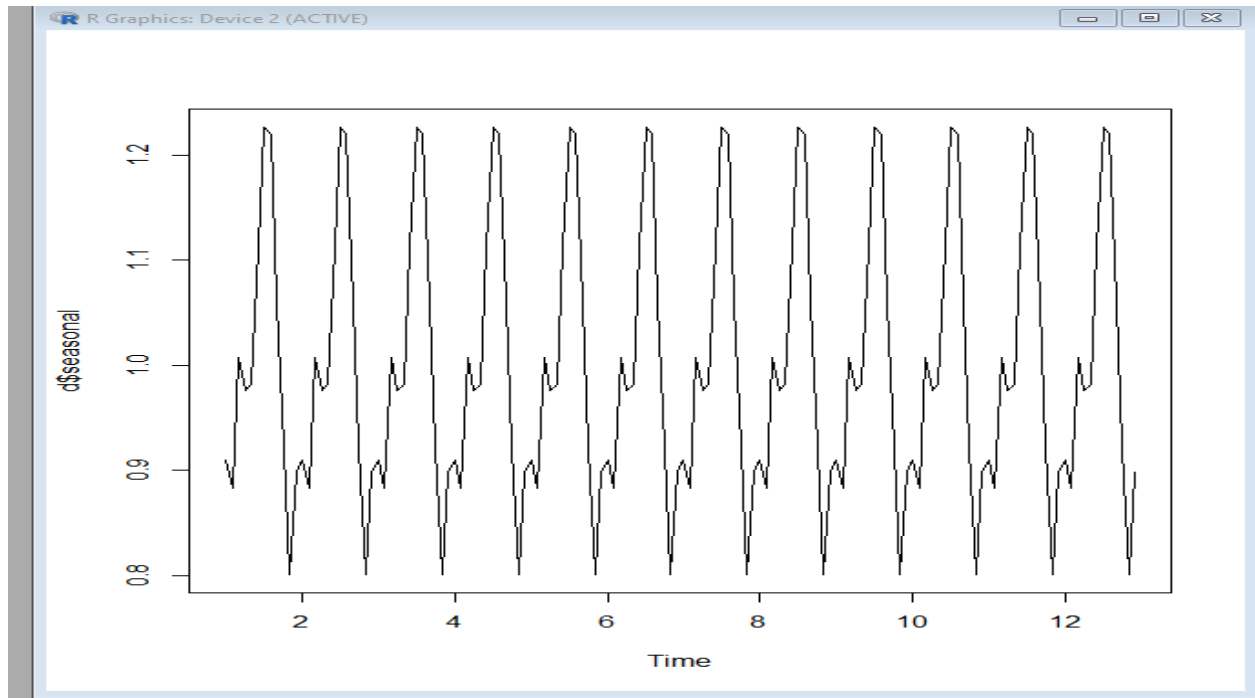
`plot(d$trend)`



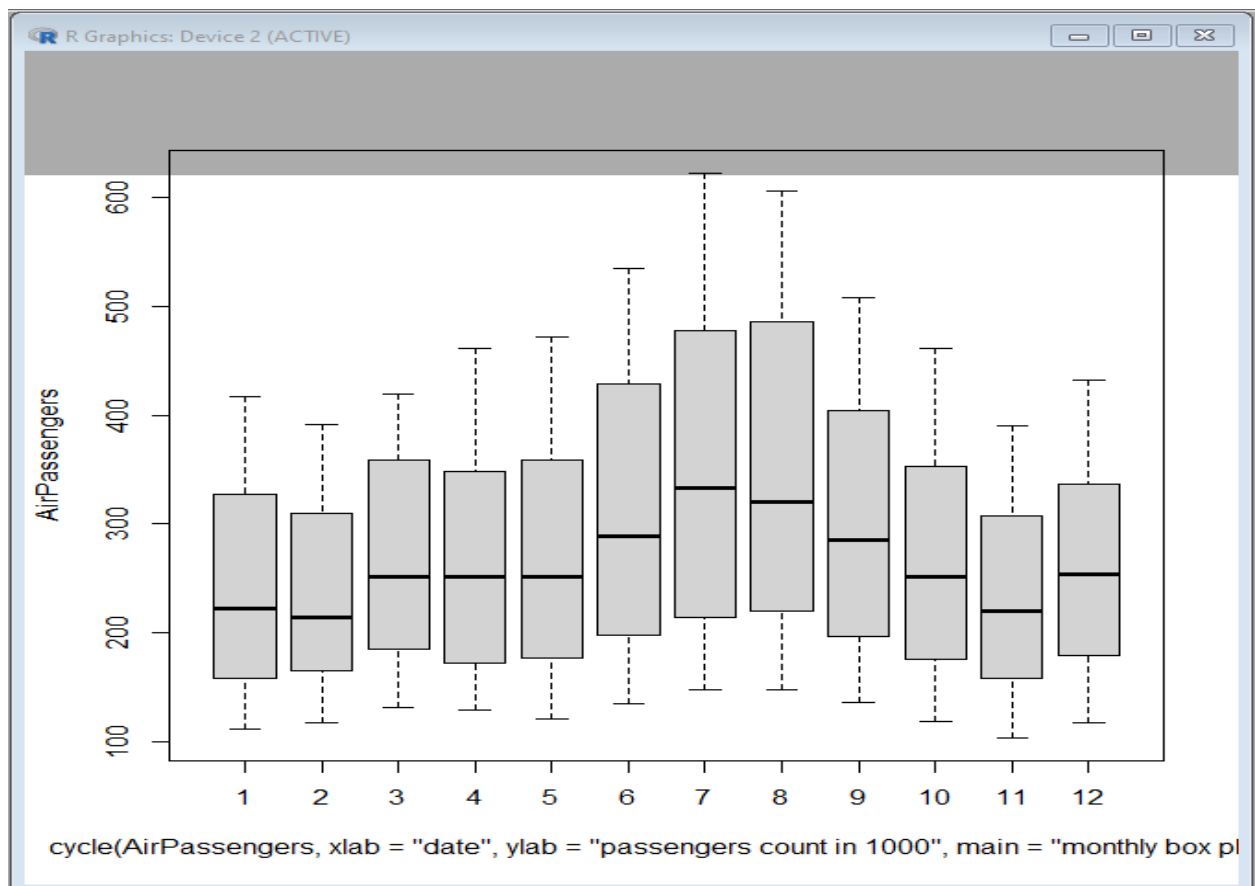
`plot(d$random)`



`plot(d$seasonal)`



```
boxplot(AirPassengers~cycle(AirPassengers,xlab="date",ylab="passengers count  
in 1000",main="monthly box plot"))
```




```
mymodel<- arima(AirPassengers)
mymodel
```

```
> mymodel<- arima(AirPassengers)
> mymodel

Call:
arima(x = AirPassengers)

Coefficients:
      intercept
      280.2986
s.e.         9.9624

sigma^2 estimated as 14292:  log likelihood = -893.18,  aic = 1790.37
> |
```