

# Lab 2: Time Series, Decomposition, and Autocorrelation

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## Quarto

Quarto enables you to weave together content and executable code into a finished document. To learn more about Quarto see <https://quarto.org>.

```
## loading packages
library(pacman)
pacman::p_load(tidyverse, here, tseries, astsa, forecast, stlplus, fpp)

## reading in csv
prism <- read_csv(here("UNR-EcoForecast-main", "data",
"tucson_prism_monthly.csv"))
```

Rows: 1483 Columns: 6

	Column	specification
--	--------	---------------

Delimiter: ",",

chr (1): Date

dbl (5): ppt\_mm, tmin\_C, tmax\_C, vpdmin-hPa, vpdmax\_hPa

i Use `spec()` to retrieve the full column specification for this data.

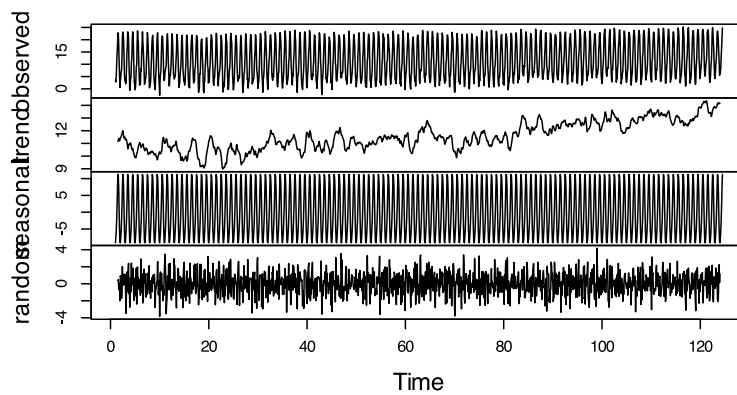
i Specify the column types or set `show\_col\_types = FALSE` to quiet this message.

## Question 1

```
## converting to time series object
tminC_ts <- ts(prism$tmin_C, frequency = 12)

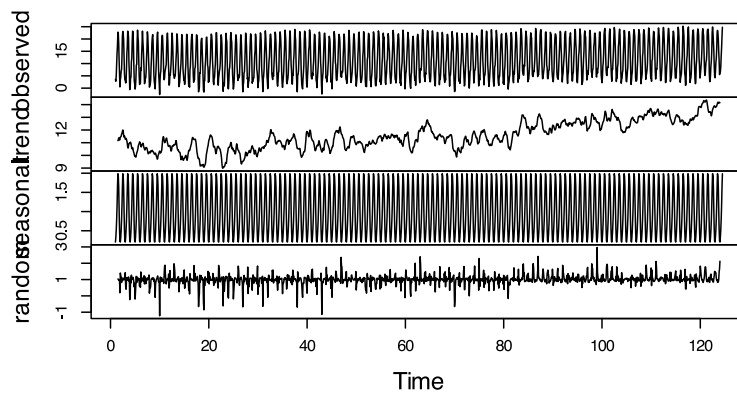
## decomposing time series object
fit_add <- decompose(tminC_ts, type = "additive")
plot(fit_add)
```

### Decomposition of additive time series

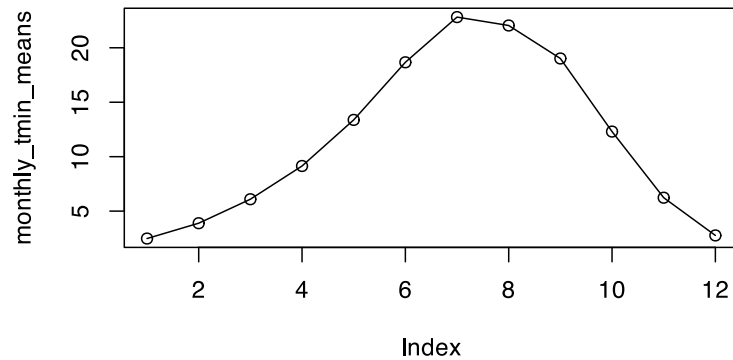


```
fit_mult <- decompose(tminC_ts, type = "multiplicative")
plot(fit_mult)
```

### Decomposition of multiplicative time series



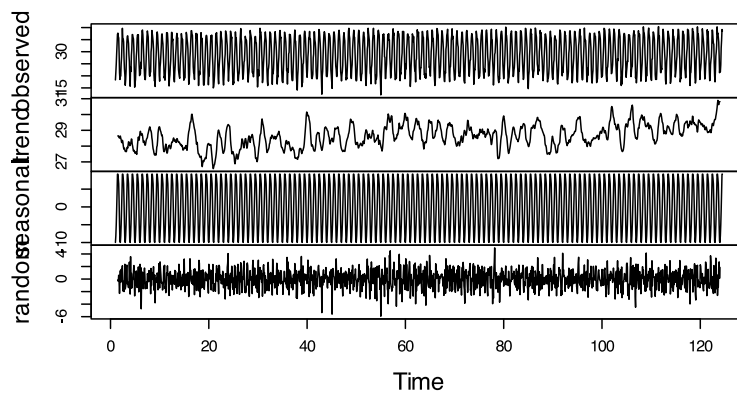
```
## converting ts to monthly means
monthly_tmin_means <- tapply(tminC_ts, cycle(tminC_ts), FUN=mean)
plot(monthly_tmin_means, type="o")
```



```
## converting tmax to time series object
tmaxC_ts <- ts(prism$tmax_C, frequency = 12)

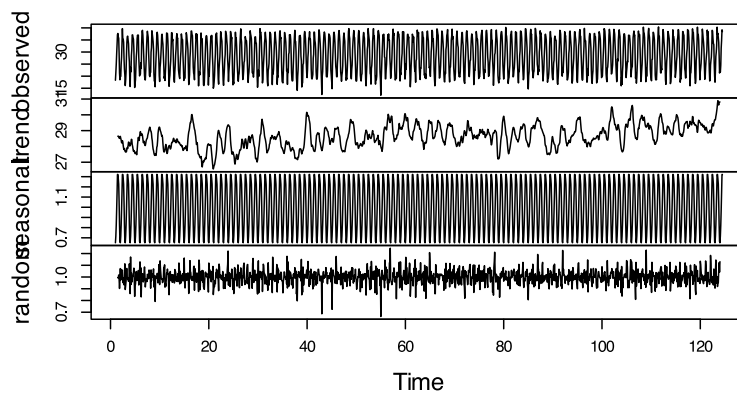
## decomposing tmax time series object
fit_tmax_add <- decompose(tmaxC_ts, type = "additive")
plot(fit_tmax_add)
```

### Decomposition of additive time series



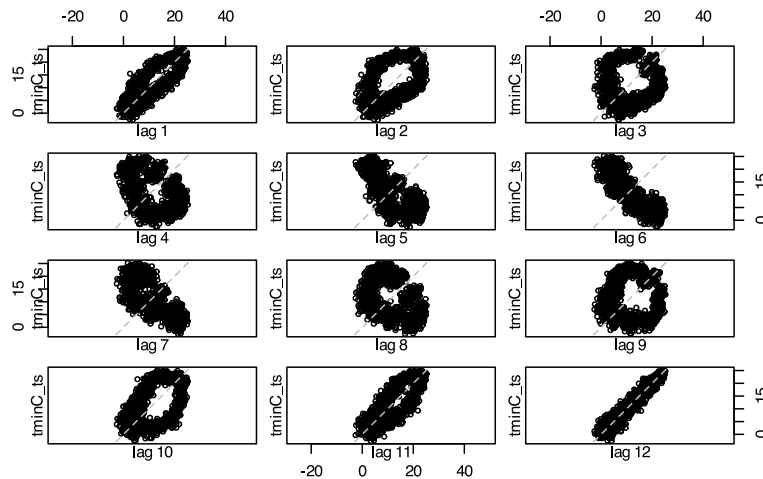
```
fit_tmax_mult <- decompose(tmaxC_ts, type = "multiplicative")
plot(fit_tmax_mult)
```

## Decomposition of multiplicative time series

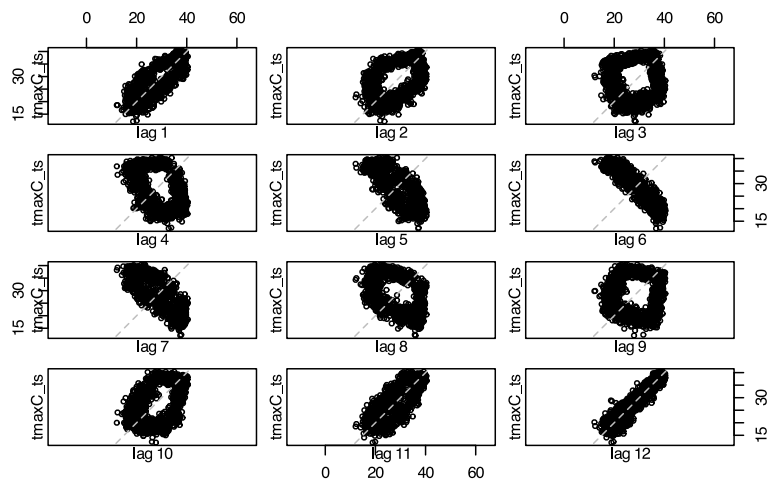


## Question 2

```
## creating lag plots
lag.plot(tminC_ts, lags=12, do.lines=FALSE)
```

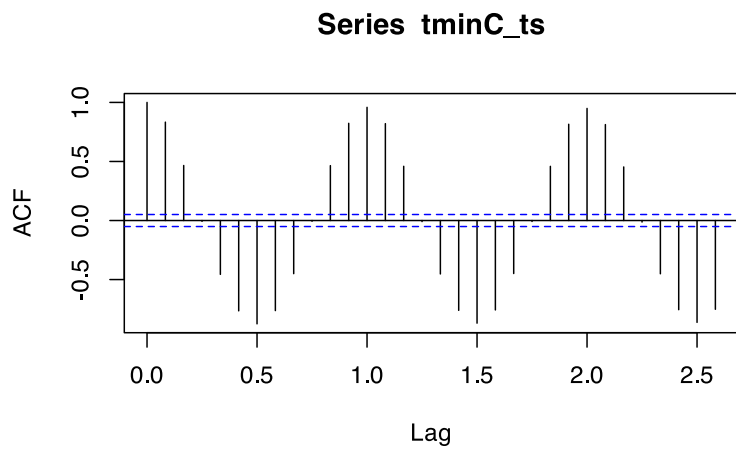


```
lag.plot(tmaxC_ts, lags=12, do.lines=FALSE)
```



### Question 3

```
acf(tminC_ts)
```



```
pacf(tminC_ts)
```

**Series tminC\_ts**

