TAutoCorr.R Summary

Wenhua Zhou(wz2812@ic.ac.uk)

October 2019

1 Original code

Listing 1: Source code for TAutoCorr.R(including comments)

```
# R practicals
# read data and compute correlation and p-value

# read data from KeyWestAnnualMeanTemperature.Rdata
load(file = "/home/nelson/Documents/CMEECoursework/Week3/
    MyRCoursework/Data/KeyWestAnnualMeanTemperature.RData")

# correlation
correlation <- cor(ats)[2,1]

# function of compute randomly permuting time series and
    calculate correlation
random_correlation <- function(x){
  a <- sample(x[,1],100) # random sample the 100 years of
      time series
  b <- cbind(a,x[,2]) # combine sampled time series and
      original temperature
  return(cor(b)[2,1]) # return the calculated correlation
}

# calculate the random correlation 10000 times
RandCor <- sapply(1:10000, function(i) random_correlation(
    ats))

# calculate the fraction of the correlation coefficients(p-
    value)
p <- sum(RandCor > correlation)/10000
```

```
> correlation
[1] 0.5331784
> p
[1] 0
```

2 Results and conclusion

From the code above, the correlation calculated by the given R data is about 0.533. This number illustrates that there is likely to be a correlation between the time series and the temperature. We can see that more precisely by looking at another output variable, the p-value is 0 in this situation. In particular from our code, this p-value means if we randomly permute time series 10000 times, there is not a single time the random correlation will be bigger than the original correlation of the data. Therefore we can conclude that the temperature is positive correlated to the time series which is years in this case.