**Description**

For this assignment, you are requested to download the **Forecast** package in R. The package contains methods and tools for displaying and analysing univariate time series forecasts including exponential smoothing via state space models and automatic ARIMA modelling. Explore the **gas** (Australian monthly gas production) dataset in Forecast package to do the following:

[Hint code]

```
install.packages("forecast")
library(forecast)
data<- forecast::gas
```

- Read the data as a time series object in R. Plot the data **(5 marks)**
- What do you observe? Which components of the time series are present in this dataset? **(5 marks)**
- What is the periodicity of dataset? **(5 marks)**
    - HINT: Please use the dataset from January 1970 for your analysis.
    - Please partition your dataset in such a way that you have the data 1994 onwards in the test data.
- Is the time series Stationary? Inspect visually as well as conduct an ADF test? Write down the null and alternate hypothesis for the stationarity test? De-seasonalise the series if seasonality is present? **(20 marks)**
- Develop an initial forecast for next 20 periods. Check the same using the various metrics, after finalising the model, develop a final forecast for the 12 time periods. Use both manual and auto.arima (Show & explain all the steps) **(20 marks)**
    - HINT: You can apply auto.arima(Train_data (refers to the train data set), seasonal=TRUE if seasonality is present in the data, FALSE is seasonality is not present.)
- Report the accuracy of the model **(5 marks)**