# AUT University School of Engineering, Computer and Mathematical Sciences STAT603: Forecasting Lab Week 1: Getting Started and Time Series Graphics

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**library**(fpp3)

**Question 1** (FPP3 1.8 Exercises: Question 1) For cases 3 and 4 in Section 1.5, list the possible predictor variables that might be useful, assuming that the relevant data are available.

**Quantity of same types of car being resold on the market (less quantity = more demand = higher price to resell, higher quantity = lower demand = less price to resell**

Vehicle age

Mileage

Location

If the car has any accidents

Depreciation rate

Season

Price

Events

Competitor Activity

Weather Conditions

Advertising

**Question 2** (FPP3 2.10 Exercises: Questions 1-2) Use the help function to explore what the series gafa\_stock, vic\_elec, and pelt represent.

1. Use autoplot() to plot some of the series in these data sets.
2. What is the time interval of each series?

Aus\_production = Quarterly

Pelt = Year by Year

Gafa\_stock = Daily On days when Markets are open

Vic\_electric = Every Half-Hour

1. Use filter() to find what days corresponded to the peak closing price for each of the four stocks in gafa\_stock.

AAPL = 2018/10/3

AMZN = 2018/09/04

FB = 2018/07/25

GOOG = 2018/07/27

**Question 3** (FPP3 2.10 Exercises: Question 3) Download the file tute1.csv from the book website, open it in Excel (or some other spreadsheet application), and review its contents. You should find four columns of information. Columns B through D each contain a quarterly series, labelled Sales, AdBudget and GDP. Sales contains the quarterly sales for a small company over the period 1981-2005. AdBudget is the advertising budget and GDP is the gross domestic product. All series have been adjusted for inflation. (a) You can read the data into R with the following script:

tute1 <- readr**::read\_csv**("tute1.csv") *# You need to change or get the working directory* **View**(tute1)

1. Convert the data to time series:

mytimeseries <- tute1 **|>**

**mutate**(Quarter = **yearquarter**(Quarter)) **|> duplicates**(index = Quarter)

1. Construct time series plots of each of the three series

mytimeseries **|>**

**pivot\_longer**(**-**Quarter) **|>**

**ggplot**(**aes**(x = Quarter, y = value, colour = name)) **+ geom\_line**() **+**

**facet\_grid**(name **~** ., scales = "free\_y")

Check what happens when you don’t include facet\_grid().

**Question 4** (FPP3 2.10 Exercises: Question 9) Use the following graphics functions: autoplot(), gg\_season(), gg\_subseries(), gg\_lag(), ACF(), and explore features from the following time series: “Total Private” Employed from us\_employment, Bricks from aus\_production, Hare from pelt, ”H02” Cost from PBS, and us\_gasoline.

1. Can you spot any seasonality, cyclicity and trend?

1

1. What do you learn about the series?
2. What can you say about the seasonal patterns? (d) Can you identify any unusual years?

2