STAT2005 Programming Languages for Statistics
Assignment 2
Due: 28 February 2025

1. Consider the built-in data frame `pressure`.

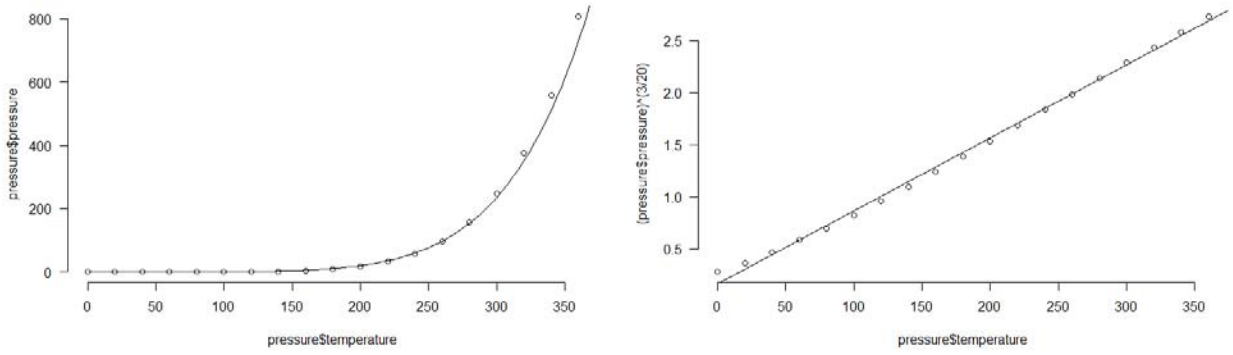
(a) Plot pressure against temperature, and use the following command to pass a curve through these data:

```
curve((0.168 + 0.007*x)^(20/3), from = 0, to = 400, add = TRUE)
```

(b) Now, apply the power transformation $y^{3/20}$ to the pressure data values. Plot these transformed values against temperature. Is a linear or nonlinear relationship evident now? Use the `abline()` function to pass a straight line through the points. (You need an intercept and slope for this – see the part (a) of this question to obtain appropriate values.)

(c) Add a suitable title to the graph.

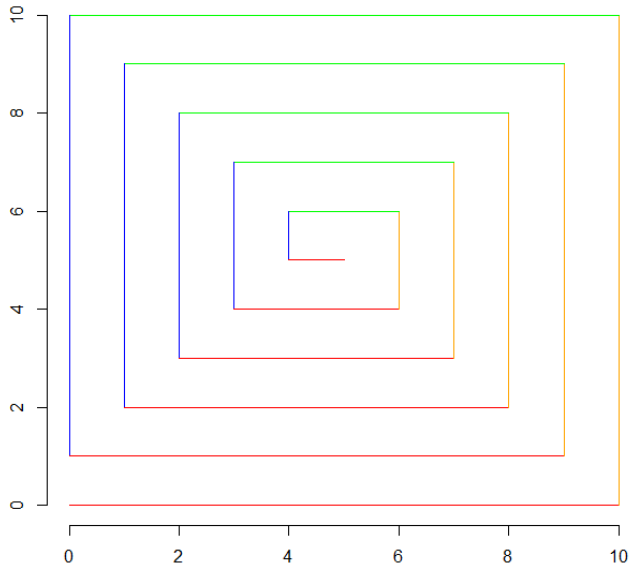
(d) Re-do the above plots, but use the `mfrow()` function to display them in a 1 × 2 layout on the graphics page. Suppress the surrounding box and arrange the numeric axis labels to be horizontal. A sample output is given below. (see `help(par)`)



2. Write a function named `alt_matrix()` which accept a positive integer `n` and return a square matrix with alternating 0 and 1 as shown below.

```
> alt_matrix(7)
     [,1] [,2] [,3] [,4] [,5] [,6] [,7]
[1,]    0    1    0    1    0    1    0
[2,]    1    0    1    0    1    0    1
[3,]    0    1    0    1    0    1    0
[4,]    1    0    1    0    1    0    1
[5,]    0    1    0    1    0    1    0
[6,]    1    0    1    0    1    0    1
[7,]    0    1    0    1    0    1    0
```

3. Use R to draw the following graph.



Note: the four colours are "`red`", "`orange`", "`green`", and "`blue`".

4. A twin prime is a pair of primes (x, y), such that $y = x + 2$. Construct a vector of all twin primes less than 1000.

You should submit a file `asg2.r` via Blackboard, which contains all the R codes you use to finish this assignment. The codes should be commented as clearly as possible. Written work (if any) should also be attached.