STAT40730
Data Programming with `R` (Online).
Lab 8: Object oriented programming

1. Familiarise yourself with the *Old Faithful* geyser data contained in the object `faithful`. Produce a density plot of the eruptions lengths with the function `density` (see lecture 5). Create an object `z` which stores the output of the density function. What class is it?

2. Use the `methods` function to find which methods are available for class `density`. (hint: use the second argument of `methods` only.)

3. Use `unclass` on your object `z`. How many tags are there in the resulting list?

4. Included in the object `z` are tags `x` and `y` with `x` a grid containing the eruption lengths and a vector `y` of the same length containing the estimated probability density. Write a `summary` method which outputs the `x` and `y` parts of the list in a 2-column matrix, as well as outputting the modal value. What is the modal eruption time (to 3 d.c.p.) for the Old Faithful data?

5. In the `boot` package there is a data set called `motor` which details the head acceleration of a motorcyclist after an accident. The first two columns of motor are the time and acceleration. (You can ignore the third and fourth columns.) Create a plot of time (x-axis) against acceleration (y-axis). Use the `lm` function to fit a cubic regression model (hint: use `lm(y ~ x + I(x^2) + I(x^3))` to create a cubic regression of `y` on `x` check the `formula` help file to see what `I` does!). Plot the fitted line (hint: use the `fitted.values` part of the resulting output list). How would you describe the fit - good or poor?

6. Use the `polyfit` functions created in lecture 8 on the motorcycle acceleration data. Which degree fits best? Create a plot of the data and the fitted line for this final chosen model.