# [MET581] Lesson: Modelling in R

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Please create an Rmarkdown document containing all text, code and output used to answer the questions.

1. There are other distance metrics that can lead to better fitted models. Change the `get_distance()` method to calculate the mean-absolute distance (MAD) instead of the root-mean-squared distance. This distance is based on the average over the absolute differences between the predicted and actual values in the data. Use `optim()` to fit this model to the simulated data sim1 and compare it to the linear model.
2. Repeat the process of model fitting, grid generation, predictions and residuals using `loess()` to set a "smooth curve" model family instead of the linear model (`lm()`) using sim1. Can you tell which model family is more adequate for sim1? What's the result of applying `geom_smooth()`?
3. For sim4, which of mod1 and mod2 is better? Hint: gather the residuals of both models to draw a frequency plot (`geom_freqpoly()`).

REMEMBER: We will be going through your Rmd file and the PDF it produces in the next lesson, try and present all of your answers as a neat report with code we can work through.