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### Assignment 1: For 15% module credit

Submission deadline: 1.00pm 14th March 2022, uploaded to the Brightspace module as a single pdf document only. [NB: multiple documents/other document formats are not accepted.] You must work on your own; material/code may not be shared.

#### Introduction

Researchers in the Radiation and Environmental Science Centre are conducting research into the effect of solar radiation on the mortality of human skin cells. Colonies of human skin cells are placed in medium and transferred to wells on experimental plates. These plates are then exposed to radiation in a solar simulator for various amounts of time from 0 (control) to 3.5 minutes. After exposure, the number of live cells in a sample are counted under a microscope and the total number of live cells in the colony is extrapolated from the sample result. The purpose of this experiment is to assess the effect of the varying times of exposure to radiation on cell death. Due to inherent variability in the response of cells, the researchers replicate their experiments a number of times. There was also concern that environmental conditions within the lab from day to day may have an impact on the results. Therefore, the experiment is repeated over a number of days. Initially the experiment is designed with complete balance; i.e. the same number of replications at each exposure time on each day. But due to experimental loss, complete balance was not reflected in the final data (e.g. some plates were contaminated and had to be discarded).

The dataset is `skincells.xls` and is available on Brightspace. The variables are:

Variable	Description
day	The day (number code) that observation was recorded.
time	The amount of radiation exposure in minutes the colony was exposed to in the solar simulator.
logcells	The logarithm (base 2) of the number of live cells in the colony extrapolated from the sample result under the microscope.

1. Using an R programme read these data into a `data.frame` and obtain basic descriptive statistics/plots of the data. Present salient features from this exploratory data analysis in your report.
2. Using an R programme, analyse these data considering the two predictors, i.e. time (continuous) and day (categorical) and the response `logcells`. You should consider the possibility of interactions between the predictors. Submit your complete R programme code with suitable explanatory in-code comments.
3. Report your findings (4 pages maximum excluding R-code): summarise the relationship between predictor(s) and the response (what are the average effects, confidence intervals, results of tests of hypotheses etc.). Present plots where appropriate.

Hint: See an example report on the Turkey data.

NB: Reports exceeding the 4 page maximum will be penalised.

#### Methods expected to be used:

Methods covered in the module up to and including video Regression.3B and lecture notes 'Lecture.3'.