Section A – Volcanos of the Holocene (10 marks)

The Global Volcanism Program (GVP) at the Smithsonian Institution maintains documentation on global volcanic activity. In this section you will use the GVP's database that catalogues volcanoes that have erupted in the last 10,000 years. The supplied dataset is:

A2A volcanos.csv

Question 1

a) Mount Vesuvius is a stratovolcano located in Italy that has erupted dozens of times. Does this dataset contain a list of all eruptions in the Holocene epoch and how do you know?
[1 mark]

b) Examine the variables Latitude, Longitude, Elevation, and Last Eruption Date and comment on whether there are any range errors or missing data.
[1 mark]

c) Create a numeric variable for last eruption date with negative values for BCE dates and positive values for CE dates. Show your code. **[1 mark]**

d) Examine the frequency distribution of the numeric date variable that you created in part (c). HINT: try PROC HPBIN to perform 'bucket' binning rather than PROC FREQ.

Is the interpretation that eruptions are becoming more frequent over time valid?
[1 mark]

e) Categorise the variable tectonic setting into two new variables:
- Platetype: Intraplate, Rift zone, Subduction zone
- Crusttype: Continental crust, Intermediate crust, Ocean crust

Your new variables should be coded numeric variables with custom formats applied. Show the frequency tables.

What are the most common types of tectonic setting for volcanic eruptions?
[1 mark]

f) Use an appropriate graph to show the frequency of tectonic settings (crust type and plate type). **[1 mark]**

g) Describe the distribution of elevation with appropriate summary statistics and a histogram.
[1 mark]

h) Compare the distribution of elevation by plate type with summary statistics and a boxplot. Is there a difference in elevation by plate type? **[2 marks]**

i) Inter-plate earthquakes are responsible for around 90% of the total seismic energy produced globally each year. Is our data consistent with this value? Why/why not?

Note: 'Inter-plate' includes rift zone and subduction zone (activity occurring at the boundaries of tectonic plates) as opposed to Intraplate activity which occurs inside plates.

[1 mark]