**STUDENT ID**

**ENVS231 Computer Practical**

Welcome to the ENVS231 practical, you will provide all your answers to the practical on this form. Failure to do this will result in a mark of zero. Do not edit the form (even if you know how). All instructions will be provided on this document. Please note I will **not respond** to emails complaining about the statistics being incorrect. The data you are using is unique to you and is marked automatically using an algorithm based on your dataset. If you have copied and rounded correctly you will get the correct mark.

In the first part of the practical you will be using the module (shown in lecture) to load in your unique dataset. This is a dataset of a wind profile, unique to every student. In this dataset you will find an array with 10080 rows (7 days of data taken at minute intervals measured in m/s) and 50 columns (relating to vertical measurement locations starting at 5m and increasing at 5m intervals). This will be stored in the variable *data.*

The first task is to create a figure of wind profile, i.e. the mean profile, this can be pasted below. You will further add two additional lines to the figure: 1) The standard deviation added to mean profile 2) The standard deviation subtracted from the mean profile. Remember to include all units, suitable axis, titles and quantities. [5 marks]

*Insert figure here*

You are now going to calculate some statistics. You will calculate the global (all measurements) mean average, mode, median and standard deviation. You will then calculate the same quantities for: 1) a measurement interval at 10% of the height from the base. 2) 40% of the height from the base. 3) 90% of the height from the base. Each answer should be rounded to two decimal places. [16 marks]

**Global Statistics**

Mean:       *m/s* Mode:       *m/s* Median:       *m/s* Standard Deviation:       *m/s*

**10% Statistics**

Mean:       *m/s* Mode:       *m/s* Median:       *m/s* Standard Deviation:       *m/s*

**40% Statistics**

Mean:       *m/s* Mode:       *m/s* Median:       *m/s* Standard Deviation:       *m/s*

**90% Statistics**

Mean:       *m/s* Mode:       *m/s* Median:       *m/s* Standard Deviation:       *m/s*

In less that 1500 characters explain why we are seeing these differences at the differing heights. Include in your discussion how you would expect these changes changed at 200% of the height and what does the standard deviation tell us about profiles characteristics. [10 marks]

You now are going to create three side-by-side histograms using the 10% / 40% and 90% data from the previous question. For this make sure you use the same scales on each of the axes and include units and suitable titles. [9 marks]

*Insert figure here*

In less than 1000 characters explain what information these histograms provide. What can you physically interpret from these figures? [6 marks]

You are now going to create three side-by-side Fourier Power Spectra plots of the 10% / 40% and 90% data. For this make sure you use the same scales on each of the axes and include units and suitable titles. [9 marks]

*Insert figure here*

In less that 1500 characters explain why we are seeing these different frequencies, what does this relate to? Further discuss how you would expect these to change under different conditions i.e. seasonal / storm conditions / in different parts of the world. [10 marks]

**The Final Big Connection**

In this final section using less than [4000 characters] and at least three scientific references (not including websites / non-peer reviewed work) connect all the findings of the previous text sections and:

1. Describe how these differences will change in rural / sub-urban / urban areas
2. Describe in detail the effect the urban environment will have on the development of this profile.
3. Discuss limitations in current measurement and modelling techniques.

Make sure to include your references formatted using the Harvard referencing system.

[35 marks]