Assignment Basic Statistics

Given: Use the dataset with your group number.
- For Part A, the dataset in the first tab contains the results of 125 microbial growth experiments. Each experiment was performed at a different temperature [°C], pH [-] and water activity [-] for a specific microorganism. At each condition, the growth rate [1/h] of the microorganism was determined.
- For Part B, the second tab contains the results of microbial challenge tests to determine the inhibition of microbial growth by two preservatives (X and Y). Specifically, the concentration of three food pathogens [log(CFU/mL)] was measured after 24 hours of incubation in the absence of preservatives (control), in the presence of preservative X and in the presence of preservative Y. Each experiment was performed 5 times.
- Load data from these datasets by using the function `readtable`.

Part A:
- Perform an analysis of variance on the data to determine which experimental factors were of influence on the growth rate of the microorganism. Consider interactions between the experimental factors in the ANOVA.
- Explain in your report how you draw a conclusion from the ANOVA table.
- Based on this analysis, determine the two experimental variables that were most significant. Present the dependent variable as a function of the two most significant independent variables in a 3D figure using the function `plot3d`. Make this figure as clear as possible.

Part B:
- Perform an analysis of variance on the experimental data to determine if there was any effect of the type of microorganism or the use of preservatives.
- Use the function `multcompare` to determine whether there was a significant effect of either of the two preservatives.
- Use the functions `mean` and `std` to determine the mean and standard deviation of the population density at each condition, based on the 5 samples.
- Make a grouped bar graph of the mean results where a clear comparison is made between the results for the control, preservative X and preservative Y for each food pathogen.
- Use the function `errorbar` to add error bars to each of the 9 results, based on the calculated standard deviations. The x-coordinates of each bar can be obtained according to the following example:

```
barHandle = bar(categoricalVariable, matrixOfResults);   % Make bar graph
xCoordinates = sort([barHandle(:).XEndPoints]);          % Obtain x-coordinates
```

- Format the figure with a legend, axis labels, title and grid lines.

Submission: Write a concise report (max 4 pages) on the statistical analysis of these results and the interpretation thereof. This assignment should be handed in as one report and two MATLAB scripts ("Group_x.zip" file containing the report, .m-files and the dataset) via email with subject [2024 Basic Statistics] to simen.akkermans@kuleuven.be.

Deadline: Sunday December 1, 2024 @ 23:59.