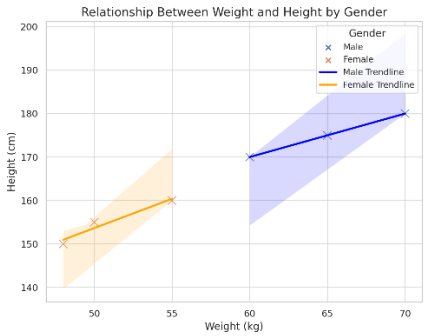
Manipal School of Life Sciences, Manipal Academy of Higher Education
Third Semester M.Sc. Bioinformatics and M.Sc. Systems Biology
University Practical Examination, January 8, 2025
Subject: Systems Biology

Time: 4 Hours (9.30 AM - 1.30 PM) Max Marks: 60

1. Write the protocol for the following questions below. (5 marks)
2. For the given raw RNA-Seq count matrix file, perform the following. (20 marks)
    a. Obtain a list of differentially expressed genes using edgeR. How many genes are reported for adj. p-value <= 0.05 and logFC <= -2 or >=2.
    b. Perform a pathway analysis using cluster profiler for obtained list of genes and report the top 5 pathways (save the bar plot).
3. From the following repository URL: https://github.com/biowizz/exam use the file file student_name.txt and perform the following actions. (10 marks)
    a. Fork the given repository to your GitHub account.
    b. Clone your forked repository to your local system.
    c. Append a new line below the existing content containing: **Your full name**
    d. Save the file and commit the change using a meaningful commit message.
    e. Push the commit to your forked repository.
    f. Create a Pull Request to the original repository.
4. Using the following dataset, create a scatter plot using ggplot2 in R that visualizes the relationship between Weight (in kilograms) and Height (in centimeters) for individuals. The dataset also includes a categorical variable Gender (Male/Female). Customize the plot to include: (10 marks)
    a. Points colored by Gender. (2.5)
    b. A trend line for each gender group. (2.5)
    c. Proper labels for the x-axis, y-axis, and the title of the plot. (2.5)
    d. Adjust the theme to make the plot visually appealing (e.g., use theme_minimal() or another custom theme). (2.5)



5. Lab record. (5 marks)
6. Viva. (10 marks)