# INTRODUCTION TO MATLAB (PROBLEM SET - 4)

## April 11th, 2025

1. In the tutorial session, you learned how to do linear interpolation from scratch. Try out that code. Check that the results will be same if we use the MATLAB's `interp1` function also. Check for the following functions:
   - $cos(x)$
   - $x^3$
   - Plot all the results.
   - `interp1` function has many other interpolation methods, plot results for those cases also.

2. In this problem, you will find derivatives;
   a. Take a 3rd order polynomial function
   b. Plot the function and its derivative, on top of each other (in the same plot). You can use the code used during the hands-on sessions.
   c. Check this also with the `diff` function, as discussed in the tutorial session
   d. Now, take a function of your choice; again, plot the function and its derivatives.
   **e. Can you guess a case, where this method will not work?**

3. All from problem 2, but perform integration instead off differentiation. (exclude part *d*)

4. *Custom function in MATLAB:* You have already seen a code for calculating factorial of a number. Can you write a function, which takes one input (the number) and provides its factorial as the output. In programming, referring a function inside itself is called **recursion**. Use this knowledge to shorten the above function using recursion.