Computational Mathematics - Problem Sheet 1

MT 2022

Once you have completed the exercises, use the `publish` *command to generate a .pdf file of your solutions.*

1. Using `fplot`, plot the graph of
$$y = e^{\sin(x^2)}$$
   for x between 0 and 2π.

2. Label the axes and add a title that includes your name and college.

3. Read Appendix B.1 of the course manual. Create a function
$$f(x) = e^{\sin(x^2)},$$
   and use it to find:
   (a) $f(0)$;
   (b) $f(\sqrt{\pi})$; and
   (c) $f(1.473)$.

   Make sure your answers appear in the published document.

4. On the same axes as Q1, plot the same function using the `plot` and `linspace` commands, and your function handle, for the following sets of evenly-spaced x-values:
   (a) 10 data points (use a green dashed line);
   (b) 20 data points (use a red dotted line); and
   (c) 500 data points (use black crosses).

5. Add a legend to your plot with each curve labelled.

6. In Chapter 1.2.3 of the course manual the notion of floating-point precision is mentioned. That is, MATLAB often stores approximations of numbers that are accurate to 10^{-16}. This error may seem insignificant, but we shall see in this exercise that failing to account for such errors could lead to big problems. Download the file `truncation_error` from the course webpage and run the script in MATLAB. Briefly explain what this code does and the meaning of the numbers that it outputs to the command window.

Hints: you may need to use `.^`, and `help plot`, `help linspace`, etc.