- Zip all your files and label the zip file as **[Roll number in lower case]_hw3.zip**
- The scripts will be executed and compared against the submitted PDF file.
- Submit a single zip file containing `.tex, .py, .pdf` and image files only.
- Generic instructions from previous homeworks stand.
- **This assignment is to be done entirely in Python**

Consider the following functions

$$\begin{aligned} f_1(x) &= x^3 - 3x^2 - x + 9 \\ f_2(x) &= e^x f_1(x) \\ f_3(x) &= x^3 - 2x + 2 \end{aligned}$$

Outline of Tasks

1. Add a section on the basic theory of the Bisection, Newton and Secant method, and how they aid in establishing roots of a function.
2. Choose two unique starting sets and find the root using all three methods. On a single plot, show $f_1(x)$ against number of iterations for both starting sets, and another plot for $f_2(x)$.
3. On another plot, for a given initial guess show the value of $f_1(x)$ against number of iterations for all three methods. Another similar plot for $f_2(x)$. What are your inferences?
4. Plot the same as above against wall-clock time instead of number of iterations. What are your inferences?
5. Perform Newtons method for $f_3(x)$ with the starting guess as $x = 0$. What do you observe? Why?