Part 2 (25 Marks)

The following equations represent two ellipses:

$$(x + y + 2)^2 + (x + 3)^2 = 5 \tag{1}$$

$$2(x + 3)^2 + \left(\frac{y}{3}\right)^2 = 4. \tag{2}$$

Requirements:

Write a MATLAB script `'ellipsesTask.m'` to

- plot the two ellipses in one figure using Matlab function `plot`:
  - The plot should be clear and contains correct labelling
- find the coordinates of all the intersections of the two ellipses defined in Eqs. (1) and (2):
  - Convert the intersection-finding problem into a root-finding problem $f(x) = 0$
  - Implement Newton's method and use it to find and print the coordinates (x, y) of all the intersections of the two ellipses. Note: you can use any online derivative finder to find $f'(x)$.
  - The Newton's method implemented should stop based on a given error margin, e.g. $\epsilon = 0.001$
- your Matlab script shouldn't use any Matlab symbolic functions such as `sym, syms`.

(25 marks)

Submission:

A Matlab script.

Marking criteria:

18-25	Working code fulfilling all task requirements with correct ellipses plot and correct coordinates calculated using Newton's method. The outputs are formatted and printed. Marks will be deducted if there are minor errors such as incorrect labeling of the figure, the coordinates not well formatted and clearly printed, etc
10-17	Working code but some requirements may not be met such as not using Matlab function `plot`, no error margin based stopping mechanism implemented for Newton's method, incorrect rood-finding problem defined, using Matlab symbolic functions and etc. Marks will be awarded according to the extent to which the requirements have been fulfilled.
5 - 9	Partially working code with no correct plot and coordinates.
0 - 4	Not working code.