Computer Assignment 1

In your answers to these questions, include all the input you gave to the program and all the output from the program. If you did not use one of the programs I wrote, then also include a copy of your program.

1. The equation

\[ x^4 - 5x^3 + 7 = 0 \]

has two real solutions. Find them both to 5 significant digits using
a) the bisection method,
b) Newton’s method,
c) the secant method.

2. The equation

\[ f(x) = x^3 - 3x + 2 = 0 \]

has a zero of multiplicity two at \( r = 1 \) (this means that \( f(r) = 0 \) and \( f'(r) = 0 \)).
a) Run Newton’s method with \( x_0 = 2 \) until you have approximated the root correctly to 5 significant figures.
b) Change your program to run the modified Newton’s method given by the recurrence relation

\[ x_{n+1} = x_n - \frac{2f(x_n)}{f'(x_n)} \]

Run this modified program with \( x_0 = 2 \) until you have approximated the root correctly to 5 significant figures.