Instructions for preparing the solution script:

- Write your name, ID#, and Section number clearly in the very front page.
- Write all answers sequentially.
- Start answering a question (not the pat of the question) from the top of a new page.
- Write legibly and in orderly fashion maintaining all mathematical norms and rules. Prepare a single solution file and rename it "ID#_FirstName_TheorySection#.pdf".
- Start working right away. There is no late submission form. If you miss the deadline, you need to use the make-up assignment to cover up the marks.

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1. (a) (2 marks) Find the minimum number of iterations required to find the root of the equation $f(x) = x^3 - x^2 - 11x + 12$ on the interval $[-6.2, -2.8]$ within the error bound δ which is equal to the machine epsilon 1×10^{-3}.

   (b) (6 marks) Find the root, $x_\star$, of the above equation within the bound of the machine epsilon on the interval $[-6.2, -2.8]$.

2. (8 marks) Use Newton's method to find the root, $x_\star$, of the equation, $f(x) = x^2 e^{-x} - 0.5$, up to machine epsilon of 1×10^{-4} starting the iteration using $x_0 = 0.2$.

3. (a) (2 marks) Find the roots of the function, $f(x) = x^6 - x^3 - 1$, analytically up to 3 decimal places.

   (b) (6 marks) Construct 2 fixed point functions $g(x)$, such that $f(x) = 0$. Also find their converging rate, λ, and determine if they will converge to any roots or not. (Make sure that one of the $g(x)$ that you construct converges to a root(s).

   (c) (4 marks) Using $x_0 = 60$, and the fixed point function $g(x)$ that converges to the root(s), find the root of the above function again using fixed point iterations accurate up to 3 decimal places.

4. (4 marks) Use secant method to find the root of the equation, $f(x) = 2x^3 + 7x^2 - 14x + 5$. Find the root accurate up to 4 decimal places starting with $x_0 = -5.5$ and $x_1 = -4.5$.

5. (8 marks) Find the root of the equation, $f(x) = xe^x - 1$ using fixed point iteration and Aitken Acceleration, accurate up to machine epsilon of 1×10^{-5}. Use the iteration formula $g(x) = e^{-x}$, and start the iteration using $x_0 = 0$.

☺☺☺ **Yes!!!!! Let the PHUN begin!!!** ☺☺☺