

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 part 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.
 - 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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A. Consider the following function, $f(x) = \frac{2x(x^2+x)-8(x+1)}{2}$. Based on these, answer the following questions:

1. (1 mark) Find the possible roots of $f(x)$ within the error bound (machine epsilon) of 1×10^{-2} using $x_0 = -10$.
2. (4 marks) State the exact roots of $f(x)$ and construct two different fixed point functions $g(x)$ such that $f(x) = 0$.
3. (5 marks) Compute the convergence rate of each fixed point function $g(x)$ obtained in the previous part, and state which is convergent or divergent.

B. Read the following questions and answer accordingly:

1. (2 marks) Consider the fixed point function, $g(x) = \frac{4x+2}{2\sqrt{x+1}}$. Show that to be super-linearly convergent, the root is $-\frac{3}{2}$.
 2. (4 marks) For $f(x) = x^3 - 2x + 2$, where $x_0 = 0$. Showing the first 2 iterations state that is it possible to find the actual root of $f(x)$. If yes, then write the actual root and if no, then state the reason.
 3. (4 marks) For $f(x) = -1 + xe^x$, find the solution of $f(x) = 0$ up to 5 iterations using Newton's method starting with $x_0 = 1.5$. (use 4 significant figures)
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