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. The **deadline is April 03, 2023** in class.

- 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. Consider A function $f(x) = x^3 - 7x^2 + 4x + 12$. This function has three roots, and one root is $x_\star = -1$.

   (a) (3 marks) Find the remaining two roots of the function $f(x)$.

   (b) (4 marks) Construct two different fixed point functions $g(x)$ such that $f(x) = 0$.

   (c) (6 marks) Compute the convergence rate, λ, for each fixed point function $g(x)$ obtained in the previous part, and state which root it is converging to or diverging.

   (d) (4 marks) Show four iterations using the Bisection Method to find the root of the above function within the interval $[4.25, 8.95]$.

   (e) (4 marks) How many iterations will be required to find the root in the Bisection method if the error bound equals the machine epsilon which is 1.4×10^{-18} and the interval is $[4.25, 8.95]$.

   (f) (6+3 marks) Starting from $x_0 = 9.26$ find the approximate root of $f(x)$ up to four iterations by using Newton's method and applying Aitken acceleration appropriately. Express your result up to five decimal places.

Motto: Mathematics is NOT difficult, but what is difficult is to believe that mathematics is NOT difficult.