3h. Total Displacement

- Use Gaussian quadrature with $N_g=3$ and $n_{int}=6$ intervals to compute the total displacement of a particle moving with velocity $u = u(t)$:

$$L_x = \int_0^2 u(t)\, dt$$

where $u(t)$ satisfies

$$u^3 + \frac{u}{4} = t$$

- Apply the Secant method with x-tolerance 10^{-10} to invert the previous relation for each value of t and use a global variable to pass time t. Print the total number of function evaluations. For the initial bracketing interval, you may choose $u \in [0,5]$.

- Try to optimize the code by improving the input guess to your Secant function.

- Upload your code with i) the output inserted in the comments at the beginning of the file, ii) the required library function at the end, e.g.

```
// Name: First Name, Last name
// Date: 06 Nov 2025
//
// Code output:
// *****************************************************
// u = ..; total_ntry = ...
// ...
// u = ..; total_ntry = ...
// Lx = ...
// *****************************************************
#include ...
...
int main()
{
  // code here
}

double Displacement_Func(double t){
  static int total_ntry = 0; // Cumulative number of function evaluations
  ...
  Secant(..);

  total_ntry += ntry;
  cout << "u = " << u << "; total_ntry = " << total_ntry << endl;
   ...
}

double Velocity_Func(double u){
...
}

<your library functions here…>
```