	Academic Year:	2024/2025	Fall Semester	
	Course Code:	CHES210	Course Title:	Data Science in Chemical Engineering
	Sheet 1 Revision on Python			

1. Analyze the CSV file to calculate student GPAs and rank them by overall GPA and Mass Transfer performance following the below requirements:

   - **Data Extraction:**

     - Load the Grades CSV file into a suitable data structure.

   - **GPA Calculation:**

     - Iterate through each student's data.
     - Use nested if-else statements to determine the GPA based on the student's marks in multiple courses.

   - **Data Organization:**

     - Sort the student data in descending order based on their calculated GPAs.
     - Within each GPA group, sort the students in descending order based on their Mass Transfer grades.

2. Free settling is one of the used techniques in water treatment units to separate the solids from water by the effect of gravity. The below relations are used to determine the terminal velocity and hence estimating the height needed to design a settling tank.
   Hence, you are required to design a program that prompt the user to enter the size of the particles in meters, the density of solid particles in $Kg.m^{-3}$ and calculate the terminal velocity, Assuming free settling conditions.
   The formulas to be used:
   (1) K criterion:

$$K = Dp\left(\frac{g\rho_f(\rho_p-\rho_f)}{\mu_f^2}\right)^{\frac{1}{3}}$$

   (2) Terminal velocity:

K<2.62	2.62<K<69.3	K>69.3
Laminar	Intermediate	Turbulent

$v_t = \frac{gD_p^2(\rho_p - \rho_f)}{18\mu_f}$	$v_t^{1.39} = \frac{gD_p^{1.61}(\rho_p - \rho_f)}{14\mu_f^{0.61}\rho_f^{0.39}}$	$v_t = \sqrt{\frac{3gD_p(\rho_p - \rho_f)}{\rho_f}}$

where ρ_f and ρ_p are the water and particle density, μ_f is the water viscosity and equals 0.001 Pa. s, g is the gravitational acceleration, Dp is the particle size, and v_t is the terminal velocity.