CSE108 – Computer Programming Lab.

Lab 7

1D and Multidimensional Array Manipulation and File I/O

18/04/2025

Part 1. Store Raw Grades in a Matrix (30 pts): Create a 2D array called `grades[10][5]`, where each row corresponds to a student and the columns represent the following scores:

Index	Grade Type
0	Midterm
1	Final
2	Homework 1
3	Homework 2
4	Homework 3

Fill this matrix with randomly generated scores between 0 and 100. Save the matrix with each row representing one student's grades.

```
=== Raw Grades [grades[10][5]] ===
Student | Midterm Final HW1  HW2  HW3
      1 |      63    35   3   27    0
      2 |      30    22  69   29   32
      3 |      97    85  23   37   22
      4 |       8    86  58   87   38
      5 |      12    60  73    5   33
      6 |      82    18  90   60   51
      7 |      83    23  52   86   16
      8 |      53    15  38   88   45
      9 |      36    85  96   60   88
     10 |      17    68  39   42   20
```

Part 2. Analyze and Transform Data into a Second Matrix (40 pts): Define another matrix called `float analysis[10][3]`. This matrix will store the following derived data for each student:

- Column 0: Final weighted grade **(0.3*midterm + 0.4*final + 0.3*homework_avg)**
- Column 1: Binary pass/fail result **(1 = passed if grade ≥ 50, else 0)**
- **Column 3:** Codes of letter grade **(90–100: 5: 'A' ; 75–89: 4: 'B' ; 65–74:3: 'C' ; 50–64: 2: 'D' ; Below 50: 1: 'F')**

```
Student | Final Grade | Pass | Letter Code
      1 |       35.90 |    0 |           1
      2 |       30.80 |    0 |           1
      3 |       71.30 |    1 |           3
      4 |       55.10 |    1 |           2
      5 |       38.70 |    0 |           1
      6 |       51.90 |    1 |           2
      7 |       49.50 |    0 |           1
      8 |       39.00 |    0 |           1
      9 |       69.20 |    1 |           3
     10 |       42.40 |    0 |           1
Legend: 5 = A, 4 = B, 3 = C, 2 = D, 1 = F
```

Implement modular functions such as: `calculateWeightedAverage, isPass.` Print the analysis matrix on the screen.

Part 3. Report Summary and Class Performance (30 pts)

Print a formatted report to both screen and a file named `class_report.txt`. The report should include:

- **Class-level statistics:** Average final grade, Number of passing students, Letter grade distribution (count of A, B, C, etc.)
-
- **Class performance category:** Avg ≥ 85 → Excellent ; Avg ≥ 70 → Satisfactory ; Avg < 70 → Needs Improvement

```
=== Class Report ===
- Average Final Grade: 48.38
- Passing Students    : 4 / 10
- Letter Grade Distribution:
  A (5): 0
  B (4): 0
  C (3): 2
  D (2): 2
  F (1): 6
- Class Performance: Needs Improvement
```