Test Code Report

1. Testing of student records addition/deletion and modification. Perform the test to have the student files at least 1000 records.
   a. Test student records addition: test_add_student.py

```
(data) (base) dingyuyao@teius-MacBook-Pro Test Code % /opt/anaconda3/envs/data/bin/python "
/Users/dingyuyao/Documents/SJSU/Spring2025/DATA200/Lab 1/Test Code/test_add_student.py"
Student ID: deborah.lynch@myscu.edu already exists.
.Invalid course IDs: DATE999
.New student Alice Johnson added successfully.
.
----------------------------------------------------------------------
Ran 3 tests in 0.001s

OK
```

   b. Test student records deletion: test_delete_student.py

```
(data) (base) dingyuyao@teius-MacBook-Pro Test Code % /opt/anaconda3/envs/data/bin/python "/Users/dingyuyao/Documents/SJSU
/Spring2025/DATA200/Lab 1/Test Code/test_delete_student.py"
.Student ID: mitchell.clark@myscu.edu deleted successfully from memory.
Student ID: mitchell.clark@myscu.edu deleted successfully from Student.csv
Student ID: mitchell.clark@myscu.edu deleted successfully from Grades.csv
.
----------------------------------------------------------------------
Ran 2 tests in 0.006s

OK
```

   c. Test student records modification: test_modify_student.py

```
(data) (base) dingyuyao@teius-MacBook-Pro Test Code % /opt/anaconda3/envs/data/bin/python "/Users/dingy
uyao/Documents/SJSU/Spring2025/DATA200/Lab 1/Test Code/test_modify_student.py"
1. Modify student's first name.
2. Modify student's last name.
3. Modify student's course IDs.
Current course IDs: DATA202
1. Modify a course ID.
2. Delete a course ID.
3. Add a new course ID.
Course ID DATA213 added successfully.
Student data saved to Student.csv successfully.
.1. Modify student's first name.
2. Modify student's last name.
3. Modify student's course IDs.
Current course IDs: DATA202
1. Modify a course ID.
2. Delete a course ID.
3. Add a new course ID.
Course ID DATA202 updated to DATA208.
Grades.csv updated successfully.
Student data saved to Student.csv successfully.
.1. Modify student's first name.
2. Modify student's last name.
3. Modify student's course IDs.
Current course IDs: DATA205, DATA218, DATA206
1. Modify a course ID.
2. Delete a course ID.
3. Add a new course ID.
Course ID DATA205 deleted successfully.
Grades.csv updated successfully.
Student data saved to Student.csv successfully.
.1. Modify student's first name.
2. Modify student's last name.
3. Modify student's course IDs.
First name updated successfully.
Student data saved to Student.csv successfully.
.1. Modify student's first name.
2. Modify student's last name.
3. Modify student's course IDs.
Invalid choice. Please try again.
.1. Modify student's first name.
2. Modify student's last name.
3. Modify student's course IDs.
Last name updated successfully.
Student data saved to Student.csv successfully.
.
----------------------------------------------------------------------
Ran 6 tests in 0.007s

OK
```

2. Load the data from previous runs saved in the csv files and you must be able to load the data and search. Once completed, print the total time taken in search cases.

   a. Test searching students: test_search_student.py

```
● (data) (base) dingyuyao@teius-MacBook-Pro Test Code % /opt/anaconda3/envs/data/bin/python "/Users/d
  ingyuyao/Documents/SJSU/Spring2025/DATA200/Lab 1/Test Code/test_search_student.py"
  Loaded 1092 student records from Student.csv.
  ---------------------------------------------------------------------------------------
  Student ID: amanda.dudley@myscu.edu, Name: Amanda Dudley
     Course ID: DATA202
  Time taken to lookup student information: 0.000008 seconds
  ---------------------------------------------------------------------------------------
  .---------------------------------------------------------------------------------------
  Student ID: lindsay.blair@myscu.edu, Name: Lindsay Blair
     Course ID: DATA217
  Time taken to lookup student information: 0.000005 seconds
  ---------------------------------------------------------------------------------------
  .Student ID: nonexist@myscu.edu not found (expected).
  .
  -------------------------------------------------------------------------
  Ran 3 tests in 0.003s

  OK
```

   b. Test searching courses: test_search_course.py

```
● (data) (base) dingyuyao@teius-MacBook-Pro Test Code % /opt/anaconda3/envs/data/bin/python "/Users/dingyuyao/Documents/SJSU/Spring2025/DATA200/L
  ab 1/Test Code/test_search_course.py"
  Loaded 19 course records from Course.csv.
  Loaded Course: DATA200, Introduction to Artificial Intelligence, Learn the basics of AI and machine learning.
  Loaded Course: DATA202, Software Engineering Principles, Explore software development processes and methodologies.
  Loaded Course: DATA203, Database Systems, Discover database design and SQL for managing data.
  Loaded Course: DATA204, Cybersecurity Basics, Learn about security measures to protect data and systems.
  Loaded Course: DATA205, Cloud Computing, Understand the basics of cloud infrastructure and services.
  Loaded Course: DATA206, Web Development, Learn to build modern web applications with HTML, CSS, and JavaScript.
  Loaded Course: DATA207, Mobile App Development, Explore techniques for creating mobile applications.
  Loaded Course: DATA208, Game Development, Learn to design and develop video games.
  Loaded Course: DATA209, Big Data Analytics, Understand tools and techniques for analyzing large datasets.
  Loaded Course: DATA211, Project Management, Master project planning and execution techniques.
  Loaded Course: DATA212, Human-Computer Interaction, Explore design principles for user interfaces.
  Loaded Course: DATA213, Operating Systems, Understand the principles and functions of operating systems.
  Loaded Course: DATA214, Computer Networks, Learn about network protocols and architectures.
  Loaded Course: DATA215, Machine Learning, Discover advanced techniques in supervised and unsupervised learning.
  Loaded Course: DATA216, Quantum Computing, An introduction to the principles of quantum computing.
  Loaded Course: DATA217, Ethical Hacking, Learn ethical hacking techniques to test and secure systems.
  Loaded Course: DATA218, Blockchain Technology, Explore the fundamentals of blockchain and its applications.
  Loaded Course: DATA219, Robotics, Learn the basics of robot design and programming.
  Loaded Course: DATA220, Robotics1, Learn the basics of robot design and programming2.
  -----------------------------------------------------------------------------------
  Course ID: DATA218, Course Name: Blockchain Technology, Description: Explore the fundamentals of blockchain and its applications.
  -----------------------------------------------------------------------------------
  Time taken to lookup the course: 0.000005 seconds
  .Course ID: PHYS101 not found (expected).
  .
  ------------------------------------------------------------------
  Ran 2 tests in 0.001s

  OK
```

   c. Test searching professors: test_search_professor.py

```
● (data) (base) dingyuyao@teius-MacBook-Pro Test Code % /opt/anaconda3/envs/data/bin/python "/Users/dingyuyao/Documents/SJSU/Spri
  ng2025/DATA200/Lab 1/Test Code/test_search_professor.py"
  Loaded 10 professor records from Professor.csv.
  Loaded Professor: jeffery.wagner@myscu.edu, Jeffery Wagner, Senior Professor, Courses: [{'course_id': 'DATA214'}, {'course_id': 'DATA204'}, {'course_id': 'DATA215'}]
  Loaded Professor: anthony.gonzalez@myscu.edu, Anthony Gonzalez, Senior Professor, Courses: [{'course_id': 'DATA212'}, {'course_id': 'DATA218'}]
  Loaded Professor: debra.gardner@myscu.edu, Debra Gardner, Senior Professor, Courses: [{'course_id': 'DATA201'}, {'course_id': 'DATA217'}, {'course_id': 'DATA208'}]
  Loaded Professor: jeffrey.lawrence@myscu.edu, Jeffrey Lawrence, Senior Professor, Courses: [{'course_id': 'DATA205'}]
  Loaded Professor: lisa.smith@myscu.edu, Lisa Smith, Associate Professor, Courses: [{'course_id': 'DATA216'}]
  Loaded Professor: linda.wolfe@myscu.edu, Linda Wolfe, Associate Professor, Courses: [{'course_id': 'DATA210'}, {'course_id': 'DATA207'}]
  Loaded Professor: matthew.moore@myscu.edu, Matthew Moore, Senior Professor, Courses: [{'course_id': 'DATA200'}]
  Loaded Professor: susan.rogers@myscu.edu, Susan Rogers, Senior Professor, Courses: [{'course_id': 'DATA206'}, {'course_id': 'DATA213'}]
  Loaded Professor: christopher.davis@myscu.edu, Christopher Davis, Associate Professor, Courses: [{'course_id': 'DATA211'}, {'course_id': 'DATA202'}]
  Loaded Professor: melanie.munoz@myscu.edu, Melanie Munoz, Assistant Professor, Courses: [{'course_id': 'DATA209'}, {'course_id': 'DATA219'}, {'course_id': 'DATA203'}]
  ----------------------------------------------------------------------------------
  Professor ID: christopher.davis@myscu.edu, Name: Christopher Davis, Rank: Associate Professor
     Course ID: DATA211
     Course ID: DATA202
  Time taken to lookup the professor: 0.000006 seconds
  ----------------------------------------------------------------------------------
  .----------------------------------------------------------------------------------
  Professor ID: matthew.moore@myscu.edu, Name: Matthew Moore, Rank: Senior Professor
     Course ID: DATA200
  Time taken to lookup the professor: 0.000004 seconds
  ----------------------------------------------------------------------------------
  .Professor ID: P999 not found (expected).
  .
  ------------------------------------------------------------------
  Ran 3 tests in 0.001s

  OK
```

d. Test searching grades: test_search_grade.py

```
Loaded Grade: Student ID: jacob.cole@myscu.edu, Course ID: DATA212, Grade: B, Marks: 84
Loaded Grade: Student ID: angela.russell@myscu.edu, Course ID: DATA218, Grade: A, Marks: 96
Loaded Grade: Student ID: angela.russell@myscu.edu, Course ID: DATA200, Grade: A, Marks: 100
Loaded Grade: Student ID: angela.russell@myscu.edu, Course ID: DATA204, Grade: D, Marks: 69
Loaded Grade: Student ID: angela.russell@myscu.edu, Course ID: DATA210, Grade: C, Marks: 75
Loaded Grade: Student ID: angela.russell@myscu.edu, Course ID: DATA209, Grade: D, Marks: 68
----------------------------------------------------------------------------------------
Student ID: nicholas.arnold@myscu.edu, Course ID: DATA211, Grades: A, Marks: 97
----------------------------------------------------------------------------------------
Time taken to lookup the grade: 0.000007 seconds
...
----------------------------------------------------------------------------
Ran 3 tests in 0.073s

OK
```

3. You must have a test case to sort the student records (ascending/descending order) based on marks or student email_address(student_id). Your report must include the timing it took to sort the records.

Since I split the student information into Student.csv, Grades.csv, I need two functions to sort the student information.

      a. Test sort the student' grades and marks records (ascending/descending order) based on marks or student_id: test_sort.py

```
● (data) (base) dingyuyao@teius-MacBook-Pro Test Code % /opt/anaconda3/envs/data/bin/python "/Users/dingyuyao/Documents/
  SJSU/Spring2025/DATA200/Lab 1/Test Code/test_sort.py"

  Testing sorting by email (student_id) in ascending order...
  No grades records found.
  Time taken to sort by email (ascending): 0.000003 seconds
  .
  Testing sorting by email (student_id) in descending order...
  No grades records found.
  Time taken to sort by email (descending): 0.000002 seconds
  .
  Testing sorting by marks in ascending order...
  No grades records found.
  Time taken to sort by marks (ascending): 0.000001 seconds
  .
  Testing sorting by marks in descending order...
  No grades records found.
  Time taken to sort by marks (descending): 0.000001 seconds
  .
  ----------------------------------------------------------------------
  Ran 4 tests in 0.000s

  OK
```

      b. Test sort the student' name and courses' records (ascending/descending order) based on student_id or student's name: test_sort2.py

```
● (data) (base) dingyuyao@teius-MacBook-Pro Test Code % /opt/anaconda3/envs/data/bin/python "/Users/dingyuyao/Documents/
  SJSU/Spring2025/DATA200/Lab 1/Test Code/test_sort2.py"

  Testing sorting by first_name in ascending order...
  No students records found.
  Time taken to sort by first_name (ascending): 0.000002 seconds
  .
  Testing sorting by first_name in descending order...
  No students records found.
  Time taken to sort by first_name (descending): 0.000002 seconds
  .
  Testing sorting by last_name in ascending order...
  No students records found.
  Time taken to sort by last_name (ascending): 0.000001 seconds
  .
  Testing sorting by last_name in descending order...
  No students records found.
  Time taken to sort by last_name (descending): 0.000001 seconds
  .
  Testing sorting by student_id in ascending order...
  No students records found.
  Time taken to sort by student_id (ascending): 0.000001 seconds
  .
  Testing sorting by student_id in descending order...
  No students records found.
  Time taken to sort by student_id (descending): 0.000001 seconds
  .
  ----------------------------------------------------------------------
  Ran 6 tests in 0.000s

  OK
```

4. Unit test to add/delete/modify the course.
    a. Test adding the course: test_add_course.py

```
● (data) (base) dingyuyao@teius-MacBook-Pro Test Code % /opt/anaconda3/envs/data/bin/python "/Users/dingy
  uyao/Documents/SJSU/Spring2025/DATA200/Lab 1/Test Code/test_add_course.py"
  Course ID already exists.
  .New course CSCI102 added successfully.
  ..
  ----------------------------------------------------------------------
  Ran 3 tests in 0.001s

  OK
```

    b. Test deleting the course: test_delete_course.py

```
● (data) (base) dingyuyao@teius-MacBook-Pro Test Code % /opt/anaconda3/envs/data/bin/python "/Users/dingyuyao/Documents/SJSU/Spring2025/DATA200/Lab 1/Test
  Code/test_delete_course.py"
  Course ID DATA210 deleted from the memory successfully.
  Course ID DATA210 deleted from Course.csv successfully.
  Course ID DATA210 deleted from Professor.csv successfully.
  Course ID DATA210 deleted from Student.csv successfully.
  Course ID DATA210 deleted from Grades.csv successfully.
  .Course ID NONEXISTENT not found.
  .Professor Debra Gardner does not teach Course ID DATA216. Deletion not allowed.
  .Course ID DATA201 deleted from the memory successfully.
  Course ID DATA201 deleted from Course.csv successfully.
  Course ID DATA201 deleted from Professor.csv successfully.
  Course ID DATA201 deleted from Student.csv successfully.
  Course ID DATA201 deleted from Grades.csv successfully.
  .
  ----------------------------------------------------------------------
  Ran 4 tests in 0.013s

  OK
```

    c. Test modifying the course: test_modify_course.py

```
● (data) (base) dingyuyao@teius-MacBook-Pro Test Code % /opt/anaconda3/envs/data/bin/python "/Users/dingyuyao/Documents/SJSU/Spring2025/DATA200/Lab 1/Test
  Code/test_modify_course.py"
  Current course details:
  Course ID: DATA210, Course Name: Digital Marketing, Description: Learn online marketing strategies and analytics.
  1. Modify course Name
  2. Modify description
  Description updated to Advanced strategies for online marketing..
  Course DATA210 updated successfully in Course.csv.
  .Current course details:
  Course ID: DATA210, Course Name: Digital Marketing, Description: Learn online marketing strategies and analytics.
  1. Modify course Name
  2. Modify description
  Course Name updated to Advanced Digital Marketing.
  Course DATA210 updated successfully in Course.csv.
  .Current course details:
  Course ID: DATA210, Course Name: Digital Marketing, Description: Learn online marketing strategies and analytics.
  1. Modify course Name
  2. Modify description
  Invalid choice. Please try again.
  .Course ID NONEXISTENT not found.
  .Professor Debra Gardner does not teach Course ID DATA216. Modification not allowed.
  .Current course details:
  Course ID: DATA201, Course Name: Data Structures and Algorithms, Description: Understand fundamental data structures and algorithms for programming.
  1. Modify course Name
  2. Modify description
  Course Name updated to Advanced Data Structures and Algorithms.
  Course DATA201 updated successfully in Course.csv.
  .
  ----------------------------------------------------------------------
  Ran 6 tests in 0.001s

  OK
```

5. Unit test to add/delete/modify professors.
    a. Test adding a professor: test_add_professor.py

```
(data) (base) dingyuyao@teius-MacBook-Pro Test Code % /opt/anaconda3/envs/data/bin/python "/Users/dingyuyao/Documen
ts/SJSU/Spring2025/DATA200/Lab 1/Test Code/test_add_professor.py"
Professor ID: debra.gardner@myscu.edu already exists.
.New professor John Doe added successfully
Professor data saved to Professor.csv successfully
.The following course IDs are already assigned to another professor: DATA201
Please choose other courses.
.The following course IDs do not exist: INVALID_COURSE
.New professor John Doe added successfully
Professor data saved to Professor.csv successfully
.
----------------------------------------------------------------------
Ran 5 tests in 0.001s

OK
```

    b. Test deleting a professor: test_delete_professor.py

```
(data) (base) dingyuyao@teius-MacBook-Pro Test Code % /opt/anaconda3/envs/data/bin/python "/Users/dingyuyao/Documen
ts/SJSU/Spring2025/DATA200/Lab 1/Test Code/test_delete_professor.py"
Professor ID: nonexistent@myscu.edu not found.
.Professor ID: debra.gardner@myscu.edu deleted successfully from memory.
Professor ID: debra.gardner@myscu.edu deleted successfully from Professor.csv
Grades for courses DATA201, DATA217, DATA208 deleted from Grades.csv.
Course IDs DATA201, DATA217, DATA208 removed from Student.csv.
Course IDs DATA201, DATA217, DATA208 deleted from Course.csv.
Course ID DATA201 removed from courses dictionary.
Course ID DATA217 removed from courses dictionary.
Course ID DATA208 removed from courses dictionary.
.
----------------------------------------------------------------------
Ran 2 tests in 0.004s
```

    c. Test modifying a professor: test_modify_professor.py

```
(data) (base) dingyuyao@teius-MacBook-Pro Test Code % /opt/anaconda3/envs/data/bin/python "/Users/dingyuyao/Documents/SJS
U/Spring2025/DATA200/Lab 1/Test Code/test_modify_professor.py"
1. Modify professor name
2. Modify professor rank
3. Modify course IDs
Current course IDs: DATA206, DATA213
1. Modify a course ID
2. Add a new course ID
3. Delete a course ID
Course ID C001 deleted from memory successfully.
Grades for Course ID C001 deleted from Grades.csv.
Course ID C001 removed from Student.csv.
Course ID C001 deleted from Course.csv.
Professor data saved to Professor.csv successfully
.1. Modify professor name
2. Modify professor rank
3. Modify course IDs
Current course IDs: DATA206
1. Modify a course ID
2. Add a new course ID
3. Delete a course ID
Course ID DATA201 is already assigned to the following professors: debra.gardner@myscu.edu
Please choose another course.
.1. Modify professor name
2. Modify professor rank
3. Modify course IDs
Name updated successfully.
Professor data saved to Professor.csv successfully
.1. Modify professor name
2. Modify professor rank
3. Modify course IDs
Rank updated successfully.
Professor data saved to Professor.csv successfully
.
----------------------------------------------------------------------
Ran 4 tests in 0.005s

OK
```