# SG3 Project Test Plan

CMP SCI 4500 – Intro to the Software Profession

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***Scenario 1: Print program explanation***
**Input:** n/a
**Expected:**
print program explanation
prompt for a csv file
**Actual:**

```
Welcome to sg3!
This program reads a csv file containing species abundance data across different dates.
It will validate the file's format and contents, then generate:
- A list of species names.
- A list of dates.
- A presence/absence matrix.
- A heat map representing abundance levels.

sg3 will also:
- Report maximum abundances per date.
- Find matching patterns in data.
- Highlight any species sharing identical patterns.

Please follow the prompts to provide a valid csv file to begin.

Please enter a valid csv file name:
```

**Executed:** 05/05/2025
**Tester:** Chris Imgarten
**Result:** **PASS**

***Scenario 2: File does not end in some variation of ".csv"***
**Input:** sg3.txt
**Expected:**
print message "sg3.txt is not a valid file name. File name must end with the .csv extension."
reprompt
**Actual:**

```
Please enter a valid csv file name:
sg3.txt
sg3.txt is not a valid file name.
File name must end with the .csv extension.
Please enter a valid csv file name:
```

**Executed:** 05/05/2025
**Tester:** Chris Imgarten
**Result:** **PASS**

***Scenario 3: Valid csv filename does not exist in current directory***
**Input:** foo.csv
**Expected:**
print message "The file, foo.csv, does not exist in current directory."
reprompt

**Actual:**

```
Please enter a valid csv file name:
foo.csv
The file, foo.csv, does not exist.
Please enter a valid csv file name:
```

**Executed:** 05/05/2025
**Tester:** Chris Imgarten
**Result:** **PASS**

***Scenario 4: Valid csv filename in a different directory than SG3***
**Input:** ./test/sg3.csv
**Expected:**
print message “The file, ./test/sg3.csv, does not exist in current directory.”
reprompt
**Actual:**

```
Please enter a valid csv file name:
./test/sg3.csv
The file, ./test/sg3.csv, does not exist in current directory.
Please enter a valid csv file name:
```

**Executed:** 05/05/2025
**Tester:** Chris Imgarten
**Result:** **PASS**

***Scenario 5: Valid csv filename, file is empty***
**Input:** sg3.csv
**Expected:**
print message “The file sg3.csv has no data.”
reprompt
**Actual:**

```
Please enter a valid csv file name:
sg3.csv
The file sg3.csv has no data.
Please enter a valid csv file name:
```

**Executed:** 05/05/2025
**Tester:** Chris Imgarten
**Result:** **PASS**

***Scenario 6: Valid csv filename, file contains only 1 line***
**Input:** sg3.CSV
,Organism A1,Organism B12,Organism_D4
**Expected:**
print message “Error in file, sg3.CSV: file does not have at least 2 lines of data”
prompt to exit

**Actual:**

```
Please enter a valid csv file name:
sg3.CSV
Error in file, sg3.CSV: file does not have at least 2 lines of data
Press ENTER to terminate.

Process ended with exit code 0.
```

**Executed:** 05/05/2025
**Tester:** Chris Imgarten
**Result:** **PASS**

***Scenario 7: Valid csv filename, file contains 1001 lines***
**Input:** sg3.CSv (a csv file with the header and 1000 more lines of data)
**Expected:**
print message “Error in file, sg3.CSv: file exceeds maximum number of lines of data allowed”
prompt to exit
**Actual:**

```
Please enter a valid csv file name:
sg3.CSv
Error in file, sg3.CSv: file exceeds maximum number of lines of data allowed
Press ENTER to terminate.

Process ended with exit code 0.
```

**Executed:** 05/05/2025
**Tester:** Chris Imgarten
**Result:** **PASS**

***Scenario 8: Valid csv filename, invalid month in date***
**Input:** sg3.CsV
,Organism A1,Organism B12,Organism_D4
00/05/1999,56,0,3
**Expected:**
print message “Error on line 2: Invalid date format ‘00/05/1999’.”
prompt to exit
**Actual:**

```
Please enter a valid csv file name:
sg3.CsV
Error on line 2: Invalid date format '00/05/1999'.
Press ENTER to terminate.

Process ended with exit code 0.
```

**Executed:** 05/05/2025
**Tester:** Chris Imgarten
**Result:** **PASS**

***Scenario 9: Valid csv filename, invalid day in date***
**Input:** sg3.cSV
,Organism A1,Organism B12,Organism_D4
01/00/1999,56,0,3
**Expected:**
print message “Error on line 2: Invalid date format ‘01/00/1999’.”
prompt to exit
**Actual:**

```
Please enter a valid csv file name:
sg3.cSV
Error on line 2: Invalid date format '01/00/1999'.
Press ENTER to terminate.

Process ended with exit code 0.
```

**Executed:** 05/05/2025
**Tester:** Chris Imgarten
**Result:** **PASS**

***Scenario 10: Valid csv filename, invalid year in date***
**Input:** sg3.Csv
,Organism A1,Organism B12,Organism_D4
01/05/99,56,0,3
**Expected:**
print message “Error on line 2: Invalid date format ‘01/05/99’.”
prompt to exit
**Actual:**

```
Please enter a valid csv file name:
sg3.Csv
Error on line 2: Invalid date format '01/05/99'.
Press ENTER to terminate.

Process ended with exit code 0.
```

**Executed:** 05/05/2025
**Tester:** Chris Imgarten
**Result:** **PASS**

***Scenario 11: Valid csv filename, invalid number of numbers (less than N)***
**Input:** sg3.cSv
,Organism A1,Organism B12,Organism_D4
01/05/1999,56,0
**Expected:**
print message “Error on line 2: Incorrect number of entries.”
prompt to exit

**Actual:**

```
Please enter a valid csv file name:
sg3.cSv
Error on line 2: Incorrect number of entries.
Press ENTER to terminate.

Process ended with exit code 0.
```

**Executed:** 05/05/2025
**Tester:** Chris Imgarten
**Result:** **PASS**

***Scenario 12: Valid csv filename, invalid number of numbers (greater than N)***
**Input:** sg3.csV
,Organism A1,Organism B12,Organism_D4
01/05/1999,56,0,3,1
**Expected:**
print message “Error on line 2: Incorrect number of entries.”
prompt to exit
**Actual:**

```
Please enter a valid csv file name:
sg3.csV
Error on line 2: Incorrect number of entries.
Press ENTER to terminate.

Process ended with exit code 0.
```

**Executed:** 05/05/2025
**Tester:** Chris Imgarten
**Result:** **PASS**

***Scenario 13: Valid csv filename, invalid number (negative)***
**Input:** sg3.csv
,Organism A1,Organism B12,Organism_D4
01/05/1999,56,0,3
02/17/1999,-4,2/3,0
**Expected:**
print message “Error on line 3: Illegal number ‘-4’.”
prompt to exit
**Actual:**

```
Please enter a valid csv file name:
sg3.csv
Error on line 3: Illegal number '-4'.
Press ENTER to terminate.

Process ended with exit code 0.
```

**Executed:** 05/05/2025
**Tester:** Chris Imgarten

**Result:** **PASS**

***Scenario 14: Valid csv filename, invalid number (format)***
**Input:** sg3.csv
,Organism A1,Organism B12,Organism_D4
01/05/1999,56,0,3
02/17/1999,12,2/3,0
**Expected:**
print message “Error on line 3: Illegal number ‘2/3’.”
prompt to exit
**Actual:**

```
Please enter a valid csv file name:
sg3.csv
Error on line 3: Illegal number '2/3'.
Press ENTER to terminate.

Process ended with exit code 0.
```

**Executed:** 05/05/2025
**Tester:** Chris Imgarten
**Result:** **PASS**

***Scenario 15: Valid csv filename, valid number of lines, valid dates, valid numbers***
**Input:** sg3.csv
,Organism A1,Organism B12,Organism_D4
01/05/1999,56,0,3
02/17/1999,12,4,0
03/05/1999,11,1,3
02/22/2000,0,4,3
06/11/2000,5,10,25
10/13/2001,14,50,50
11/12/2001,0,6,22

**Expected Console Output:**
print message “There are 3 species and 7 dates in the csv file sg3.csv.”
prompt to continue
print message “01/05/1999: Max abundance = 56.0, Species: Organism A1”
print message “02/17/1999, Max abundance = 12.0, Species: Organism A1”
print message “03/05/1999, Max abundance = 11.0, Species: Organism A1”
print message “02/22/2000, Max abundance = 4.0, Species: Organism B12”
print message “06/11/2000, Max abundance = 25.0, Species: Organism_D4”
print message “10/13/2001, Max abundance = 50.0, Species: Organism B12, Organism_D4”
print message “11/12/2001, Max abundance = 22.0, Species: Organism_D4”
print message “Vector 1,1,1 occurs 3 times on dates: 03/05/1999, 06/11/2000, 10/13/2001”
print message “Vector 0,1,1 occurs 2 times: 02/22/2000, 11/12/2001”

**Expected Species.txt:**
Organism A1
Organism B12
Organism_D4

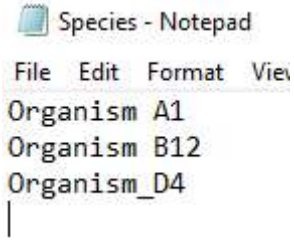
**Expected DatedData.txt:**
01/05/1999
02/17/1999
03/05/1999
02/22/2000
06/11/2000
10/13/2001
11/12/2001

**Expected PresentAbsent.txt:**
,Organism A1,Organism B12,Organism_D4
01/05/1999,1,0,1
02/17/1999,1,1,0
03/05/1999,1,1,1
02/22/2000,0,1,1
06/11/2000,1,1,1
10/13/2001,1,1,1
11/12/2001,0,1,1

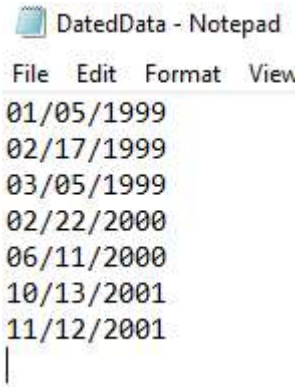
**Actual Console Output:**

```
Please enter a valid csv file name:
sg3.csv

There are 3 species and 7 dates in the csv file sg3.csv.
Press ENTER to continue.

Max Abundance Report:
01/05/1999: Max abundance = 56.0, Species: Organism A1
02/17/1999: Max abundance = 12.0, Species: Organism A1
03/05/1999: Max abundance = 11.0, Species: Organism A1
02/22/2000: Max abundance = 4.0, Species: Organism B12
06/11/2000: Max abundance = 25.0, Species: Organism_D4
10/13/2001: Max abundance = 50.0, Species: Organism B12, Organism_D4
11/12/2001: Max abundance = 22.0, Species: Organism_D4

Dates with identical presence/absence vectors:
Vector 1,1,1 occurs 3 times on dates: 03/05/1999, 06/11/2000, 10/13/2001
Vector 0,1,1 occurs 2 times on dates: 02/22/2000, 11/12/2001
```

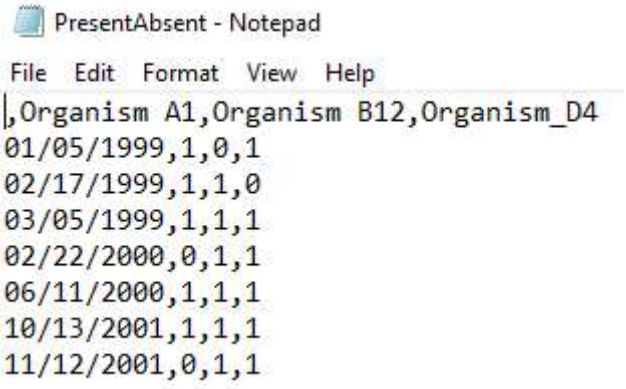
**Actual Species.txt:**



**Actual DatedData.txt:**




**Actual PresentAbsent.txt:**




**Executed:** 05/05/2025
**Tester:** Chris Imgarten
**Result:** **PASS**

***Scenario 16: Generate heat map with distinct values***
**Input:** validTestFile.csv
, Organism A,Organism B 01/01/2000,10,90 01/02/2000,30,60 01/03/2000,90,30
**Expected:** Abundance ranges calculated per species

Organism A: low=10, high=90 → A=36.67, B=63.33 → Heat = [L, M, H]
Organism B: low=30, high=90 → A=50, B=70 → Heat = [H, M, L]

HeatMap.txt:
01/01/2000 L H
01/02/2000 M M
01/03/2000 H L

Console: same heatmap printed using "-", "o", and "X"

**Actual:**

```
Max Abundance Report:
01/01/2000: Max abundance = 90.0, Species: Organism B
01/02/2000: Max abundance = 60.0, Species: Organism B
01/03/2000: Max abundance = 90.0, Species:  Organism A

Dates with identical presence/absence vectors:
Vector 1,1 occurs 3 times on dates: 01/01/2000, 01/02/2000, 01/03/2000
           |  Organism A | Organism B
-------------------------------------
01/01/2000 | -           | X
01/02/2000 | -           | o
01/03/2000 | X           | -
```

**Executed:** 5/5/2025
**Tester:** Aaron Little
**Result:** **PASS**

***Scenario 17: Species has same abundance values across all dates***

**Input:** csv
,Organism A
01/01/2000,50
01/02/2000,50
01/03/2000,50

**Expected:** Low = High = 50 → all values classified as same level (likely Medium)
HeatMap.txt:

01/01/2000 M
01/02/2000 M
01/03/2000 M

**Actual:**

```
Max Abundance Report:
01/01/2000: Max abundance = 50.0, Species: Organism A
01/02/2000: Max abundance = 50.0, Species: Organism A
01/03/2000: Max abundance = 50.0, Species: Organism A

Dates with identical presence/absence vectors:
Vector 1 occurs 3 times on dates: 01/01/2000, 01/02/2000, 01/03/2000
           | Organism A
-----------------------
01/01/2000 | o
01/02/2000 | o
01/03/2000 | o
```

**Executed:** 5/5/2025
**Tester:** Aaron Little
**Result:** **PASS**

***Scenario 18: Detect duplicate HML patterns***

**Input:**
,Species A,Species B
01/01/2000,0,0

01/02/2000,30,30
01/03/2000,90,90

**Expected:** Both species have same HML pattern: L, M, H, Message: "Species A and Species B share HML profile LMLH"

**Actual:**

```
Max Abundance Report:
01/01/2000: Max abundance = 0.0, Species: Species A, Species B
01/02/2000: Max abundance = 30.0, Species: Species A, Species B
01/03/2000: Max abundance = 90.0, Species: Species A, Species B

Dates with identical presence/absence vectors:
Vector 1,1 occurs 2 times on dates: 01/02/2000, 01/03/2000
           | Species A | Species B
-----------------------------------
01/01/2000 | -         | -
01/02/2000 | o         | o
01/03/2000 | X         | X

On 01/01/2000, the following species: ['Species A', 'Species B'], had identical heat value, '-'.

On 01/02/2000, the following species: ['Species A', 'Species B'], had identical heat value, 'o'.

On 01/03/2000, the following species: ['Species A', 'Species B'], had identical heat value, 'X'.
```

**Executed:** 5/5/2025
**Tester:** Aaron Little
**Result:** **PASS**

***Scenario 19: No matching HML profiles***
**Input:**
,Species A,Species B
01/01/2000,0,90
01/02/2000,30,60
01/03/2000,90,30

**Expected:** Species A: L, M, H; Species B: H, M, L; Console: "No species share the same HML profile."

**Actual:**

```
Max Abundance Report:
01/01/2000: Max abundance = 90.0, Species: Species B
01/02/2000: Max abundance = 60.0, Species: Species B
01/03/2000: Max abundance = 90.0, Species: Species A

Dates with identical presence/absence vectors:
Vector 1,1 occurs 2 times on dates: 01/02/2000, 01/03/2000
           | Species A | Species B
-----------------------------------
01/01/2000 | -         | X
01/02/2000 | o         | o
01/03/2000 | X         | -
No identical heat value patterns were found among the species.
```

**Executed:** 5/6/2025
**Tester:** Aaron Little
**Result:** **PASS**

***Scenario 20: HeatMap.txt formatting***

**Input:**
,Species A,Species B
01/01/2000,10,80
01/02/2000,50,50
01/03/2000,90,20

**Expected:**
01/01/2000 L H
01/02/2000 M M
01/03/2000 H L

**Actual:**

```
Max Abundance Report:
01/01/2000: Max abundance = 80.0, Species: Species B
01/02/2000: Max abundance = 50.0, Species: Species A, Species B
01/03/2000: Max abundance = 90.0, Species: Species A

Dates with identical presence/absence vectors:
Vector 1,1 occurs 3 times on dates: 01/01/2000, 01/02/2000, 01/03/2000
            | Species A | Species B
----------------------------------
01/01/2000 | -         | X
01/02/2000 | o         | o
01/03/2000 | X         | -

On 01/02/2000, the following species: ['Species A', 'Species B'], had identical heat value, 'o'.
```

**Executed:** 5/5/2025
**Tester:** Aaron Little
**Result:** **PASS**

***Scenario 21: Heat map uses correct ASCII characters***

**Input:** Same as Scenario 20
**Expected:** Screen output uses: - for Low, o for Medium, X for High
01/01/2000 - X
01/02/2000 o o
01/03/2000 X -

**Actual:**

```
Max Abundance Report:
01/01/2000: Max abundance = 80.0, Species: Species B
01/02/2000: Max abundance = 50.0, Species: Species A, Species B
01/03/2000: Max abundance = 90.0, Species: Species A

Dates with identical presence/absence vectors:
Vector 1,1 occurs 3 times on dates: 01/01/2000, 01/02/2000, 01/03/2000
            | Species A | Species B
----------------------------------
01/01/2000 | -         | X
01/02/2000 | o         | o
01/03/2000 | X         | -

On 01/02/2000, the following species: ['Species A', 'Species B'], had identical heat value, 'o'.
```

**Executed:** 5/5/2025
**Tester:** Aaron Little
**Result:** **PASS**

***Scenario 22: HeatMap.txt is overwritten on re-run***
**Input:**
,Organism A,Organism B
01/01/2000,10,90
01/02/2000,30,60
01/03/2000,90,30

Expected HeatMap.txt (after first run):
01/01/2000 L H
01/02/2000 M M
01/03/2000 H L

**Expected:** HeatMap.txt is completely replaced by second run's results

**Actual:**

```
Max Abundance Report:
01/01/2000: Max abundance = 90.0, Species: Organism B
01/02/2000: Max abundance = 60.0, Species: Organism B
01/03/2000: Max abundance = 90.0, Species: Organism A

Dates with identical presence/absence vectors:
Vector 1,1 occurs 3 times on dates: 01/01/2000, 01/02/2000, 01/03/2000
           | Organism A | Organism B
-----------------------------------
01/01/2000 | -          | X
01/02/2000 | -          | o
01/03/2000 | X          | -

No duplicate heat values found on any given date.
```

```
Max Abundance Report:
01/01/2000: Max abundance = 50.0, Species: Organism A
01/02/2000: Max abundance = 50.0, Species: Organism A
01/03/2000: Max abundance = 50.0, Species: Organism A

Dates with identical presence/absence vectors:
Vector 1 occurs 3 times on dates: 01/01/2000, 01/02/2000, 01/03/2000
           | Organism A
----------------------
01/01/2000 | o
01/02/2000 | o
01/03/2000 | o

No duplicate heat values found on any given date.
```

**Executed:** 5/5/2025
**Tester:** Aaron Little
**Result:** **PASS**