# **Sim City Land Value Calculator Version 4: Calculate statistics**

Finally, let’s calculate the maximum and average values in the grid, then display these stats.

## **What to do**

Implement find\_max() and find\_average() functions that calculate the maximum and the average values in the grid and update the main() function so that it prints them.

You must use the following template:

| **def** **create\_grid**(filename: str) -> list[list[int]]:  """  Create a grid of land values from a file  """  *# Implemented in Version 1*  **pass**   **def** **display\_grid**(grid: list[list[int]]) -> **None**:  """  Display a grid of land values  """  *# Implemented in Version 1*  **pass**    **def** **find\_neighbor\_values**(grid: list[list[int]], row: int, col: int) -> list[int]:  """  Find the neighbors of a cell  """  *# Implemented in Version 2*  **pass**    **def** **fill\_gaps**(grid: list[list[int]]) -> list[list[int]]:  """  Fill the gaps in the grid  Creates a new grid with the same dimensions as the original grid  Calls find\_neighbor\_values() to find the neighbors of each cell  Do NOT modify the original grid!  """  *# Implemented in Version 3*  **pass**    **def** **find\_max**(grid: list[list[int]]) -> int:  """  Find the max value in the grid (rounded to the nearest integer)  """  *# TODO: Get the maximum value in the grid*  **pass**  **def** **find\_average**(grid: list[list[int]]) -> int:  """  Find the average value in the grid (rounded to the nearest integer)  """  *# TODO: Get the average value of the grid*  **pass**   **def** **main**() -> **None**:  """  Main program.  """  grid = create\_grid("data\_0.txt")  print("Sim City Land Values:")  display\_grid(grid)  print("\nCalculated Sim City land values:")  new\_grid = fill\_gaps(grid)  display\_grid(new\_grid)  print("\nSTATS")  print(f"Average land value in this city: {find\_average(new\_grid)}")  print(f"Maximum land value in this city: {find\_max(new\_grid)}") |
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## **Hints**

* You can use nested loops to find the maximum and average values.

## **Program name**

Save your program as simcity4.py.

## **Demo**

In this demo, data\_1.txt is used.

<https://asciinema.org/a/NdueVP9SBQfVMQyNhAORMy8Ql>

## **Testing**

To make sure your program works correctly, you should test it.

* Run your program with python simcity4.py with data\_0.txt Your program should print:

| Sim City Land Values:  1 0 3 4   5 6 7 8   9 10 11 12   13 14 15 16   Calculated Sim City land values:  1 4 3 4   5 6 7 8   9 10 11 12   13 14 15 16   STATS Average land value in this city: 9 Maximum land value in this city: 16 |
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* Run your program with python simcity4.py with data\_1.txt Your program should print:

| Sim City Land Values:  76000 0 54000 16000 83000   27000 49000 62000 0 31000   0 48000 53000 22000 19000   71000 37000 63000 41000 0   83000 25000 0 16000 59000   Calculated Sim City land values:  76000 53600 54000 16000 83000   27000 49000 62000 42500 31000   46400 48000 53000 22000 19000   71000 37000 63000 41000 31400   83000 25000 36400 16000 59000   STATS Average land value in this city: 45812 Maximum land value in this city: 83000 |
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* Run your program with python simcity4.py with data\_2.txt Your program should print:

| Sim City Land Values:  94000 64000 30000 0 14000 92000   37000 49000 50000 29000 35000 0   0 88000 85000 96000 60000 22000   13000 44000 73000 0 45000 53000   20000 33000 67000 71000 82000 0   36000 0 62000 55000 44000 75000   Calculated Sim City land values:  94000 64000 30000 31600 14000 92000   37000 49000 50000 29000 35000 44600   46200 88000 85000 96000 60000 22000   13000 44000 73000 72375 45000 53000   20000 33000 67000 71000 82000 59800   36000 43600 62000 55000 44000 75000   STATS Average land value in this city: 53227 Maximum land value in this city: 96000 |
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* Run your program with python simcity4.py with data\_3.txt Your program should print:

| Sim City Land Values:  24000 57000 50000 43000   38000 0 16000 62000   51000 25000 49000 0   0 76000 19000 34000   Calculated Sim City land values:  24000 57000 50000 43000   38000 38750 16000 62000   51000 25000 49000 36000   50667 76000 19000 34000   STATS Average land value in this city: 41839 Maximum land value in this city: 76000 |
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## **Submitting**

Submit simcity4.py via eClass.

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