

LEC 14

**CSE 121**

# 2D Arrays

Questions during Class?

Raise hand or send here

**sli.do**    **#cse121**

BEFORE WE START

*Talk to your neighbors:**What's left on your 2024-25  
academic year bucket list?*Music: ♣ [CSE 121 25su Lecture Tunes](#) ♣**Instructor:** Hannah Swoffer

|             |        |       |
|-------------|--------|-------|
| <b>TAs:</b> | Abby   | Merav |
|             | Hannah | Trey  |
|             | Julia  |       |

# Announcements, Reminders

- C3 due **tonight**
- P3 will be released later today, due ***Wednesday, August 20<sup>th</sup>***
- R6 will be released later today, due **Tuesday, August 19<sup>th</sup>**
  - Eligible: **C2**, P2, C3
- Quiz 2 is **tomorrow**
  - Reference sheet linked from the [Quiz 2 Practice Quizzes post](#)
  - Conditionals, while Loops, User Input (Scanner), Arrays
- Quiz 2 Practice Quizzes released; very helpful resources for the quiz



# Announcements, Reminders

- In the future
  - Gumball meetup on **Wednesday, August 20<sup>th</sup> from 2:30-4:00 PM** near Drumheller Fountain
  - Final exam on **Friday, August 22nd from 12:00-1:00 PM** during lecture



# Announcements, Reminders

- PSW extra resubmission
  - If you've attended 9 sections, you will receive an email on Tuesday, August 19<sup>th</sup> with a link to R8
  - Due Friday, August 22<sup>nd</sup> at 5:00 PM
  - Check Canvas to see how many you've completed
  - Details about the [PSW → Extra Resub posted on Ed!](#)
- 2D Array section
  - Since Quiz 2 is tomorrow, the 2D array section won't happen until Tuesday, August 19<sup>th</sup> but P3 relies heavily on 2D arrays
  - Therefore, this section will release at 1:30pm today with walkthrough videos filmed by the TAs and I that explain the problems
  - Details in the [2D Array Section / P3 Ed Post](#)





# Practice: Think

[sli.do](https://sli.do)

#cse121

```
public static void main(String[] args) {  
    int x = 0;  
    int[] a = new int[4];  
    x++;  
  
    mystery(x, a);  
    System.out.println(x + " " + Arrays.toString(a));  
  
    x++;  
    mystery(x, a);  
    System.out.println(x + " " + Arrays.toString(a));  
}  
  
public static void mystery(int x, int[] a) {  
    x++;  
    a[x]++;  
    System.out.println(x + " " + Arrays.toString(a));  
}
```

Four lines of output are produced by this code. What would those four lines be?





# Practice: Pair

[sli.do](https://sli.do)

#cse121

```
public static void main(String[] args) {  
    int x = 0;  
    int[] a = new int[4];  
    x++;  
  
    mystery(x, a);  
    System.out.println(x + " " + Arrays.toString(a));  
  
    x++;  
    mystery(x, a);  
    System.out.println(x + " " + Arrays.toString(a));  
}  
  
public static void mystery(int x, int[] a) {  
    x++;  
    a[x]++;  
    System.out.println(x + " " + Arrays.toString(a));  
}
```

Four lines of output are produced by this code. What would those four lines be?



# PCM Review: 2D Arrays

```
int[][] a = new int[4][3];
```

type                  name                  array creation code

*An array of arrays!*

The type of each individual element is another array!

- Your first example of “nested data structures”
- There will be more if you take CSE 122!

int[][]

double[][]

String[][]

boolean[][]

char[][]



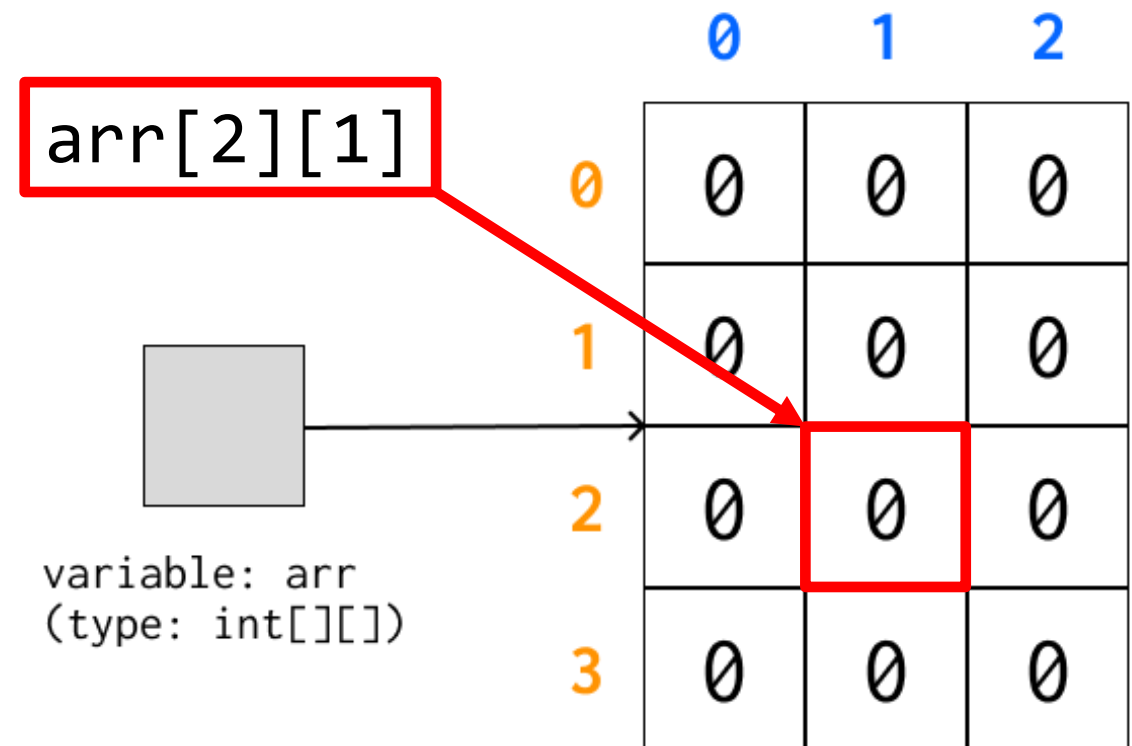


# PCM Review: 2D Arrays as Rows and Columns

Can think of the two dimensions as “rows” and “columns”.

Individual elements are row-first, then column (“row-major”)

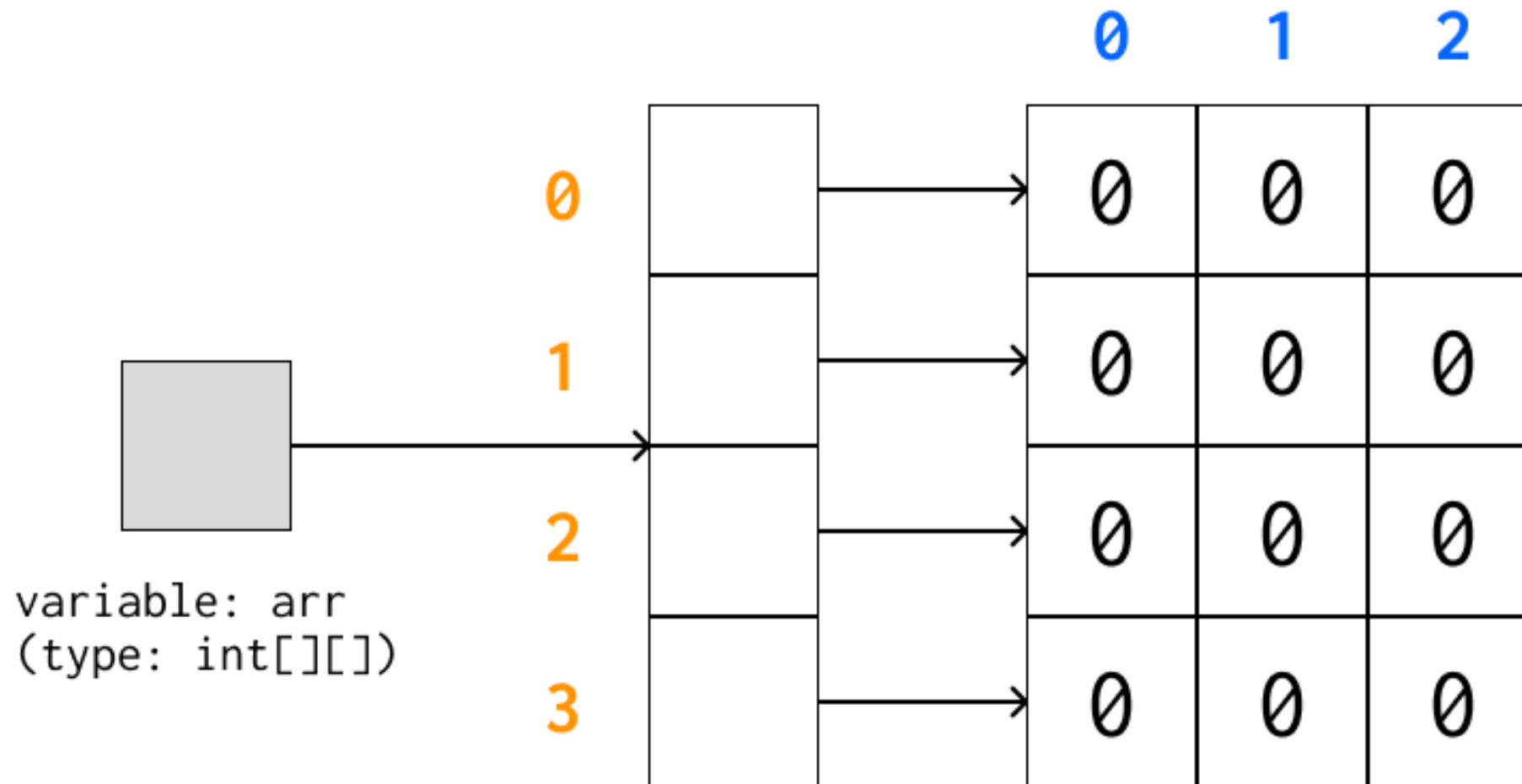
```
int[][] arr = new int[4][3]
```





# A more accurate view (reference semantics)

```
int[][] arr = new int[4][3]
```



# PCM Review: 2D Array Traversals

*for each row...*

```
for (int i = 0; i < list.length; i++) {  
    for (int j = 0; j < list[i].length; j++) {  
        // do something with list[i][j]  
    }  
}
```

*for each element within a row...*



# Arrays Utility Class (and methods)

| Method                                          | Description                                                                                                                                                                                                          |
|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>Arrays.toString(array);</code>            | Returns a <code>String</code> representing the array, such as <code>"[10, 30, -25, 17]"</code>                                                                                                                       |
| <code>Arrays.equals(array1, array2);</code>     | Returns <code>true</code> if the two arrays contain the same elements in the same order                                                                                                                              |
| <code>Arrays.deepToString(array);</code>        | Returns a <code>String</code> representing the array; if the array contains other arrays as elements, the <code>String</code> represents their contents, and so on. For example, <code>"[[99, 151], [30, 5]]"</code> |
| <code>Arrays.deepEquals(array1, array2);</code> | Returns <code>true</code> if the two arrays contain the same elements in the same order; if the array(s) contain other arrays as elements, their contents are tested for equality, and so on.                        |



# Applications of 2D Arrays

- **Matrices**
  - Useful in *so many* applications in math, engineering, and statistics
  - Fundamental to machine learning & AI
  - P3 is one real-life application of this! (bioinformatics)
- Board games
  - e.g. chess, checkers, tic-tac-toe, sudoku
- Tabular or grid-like data
  - e.g. scorekeeping, gradebook, census data
- Image processing

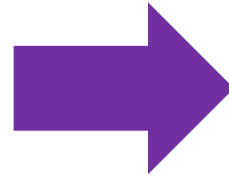


# matrixAdd

|    |    |    |    |    |
|----|----|----|----|----|
| 23 | 96 | 18 | 4  | 64 |
| 45 | 40 | 18 | 44 | 34 |
| 92 | 13 | 77 | 71 | 12 |



|    |    |    |    |    |
|----|----|----|----|----|
| 70 | 73 | 66 | 79 | 39 |
| 91 | 75 | 73 | 99 | 47 |
| 27 | 64 | 21 | 34 | 1  |



|  |  |  |  |  |
|--|--|--|--|--|
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |



# matrixAdd: first row

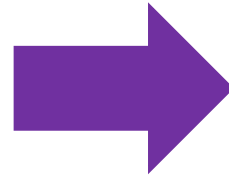
|    |    |    |    |    |
|----|----|----|----|----|
| 23 | 96 | 18 | 4  | 64 |
| 45 | 40 | 18 | 44 | 34 |
| 92 | 13 | 77 | 71 | 12 |



|    |    |    |    |    |
|----|----|----|----|----|
| 70 | 73 | 66 | 79 | 39 |
| 91 | 75 | 73 | 99 | 47 |
| 27 | 64 | 21 | 34 | 1  |

i: 0

j: 0



|  |  |  |  |  |
|--|--|--|--|--|
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |



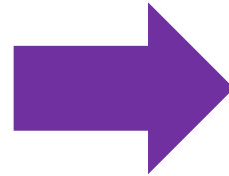
# matrixAdd: 0,0

|           |    |    |    |    |
|-----------|----|----|----|----|
| <u>23</u> | 96 | 18 | 4  | 64 |
| 45        | 40 | 18 | 44 | 34 |
| 92        | 13 | 77 | 71 | 12 |



|           |    |    |    |    |
|-----------|----|----|----|----|
| <u>70</u> | 73 | 66 | 79 | 39 |
| 91        | 75 | 73 | 99 | 47 |
| 27        | 64 | 21 | 34 | 1  |

i: 0  
j: 0



|           |  |  |  |  |
|-----------|--|--|--|--|
| <u>93</u> |  |  |  |  |
|           |  |  |  |  |
|           |  |  |  |  |





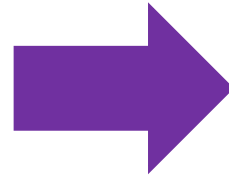
# matrixAdd: 0,1

|    |           |    |    |    |
|----|-----------|----|----|----|
| 23 | <u>96</u> | 18 | 4  | 64 |
| 45 | 40        | 18 | 44 | 34 |
| 92 | 13        | 77 | 71 | 12 |



|    |           |    |    |    |
|----|-----------|----|----|----|
| 70 | <u>73</u> | 66 | 79 | 39 |
| 91 | 75        | 73 | 99 | 47 |
| 27 | 64        | 21 | 34 | 1  |

i: 0  
j: 1



|    |            |  |  |  |
|----|------------|--|--|--|
| 93 | <u>169</u> |  |  |  |
|    |            |  |  |  |
|    |            |  |  |  |



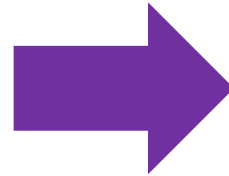
# matrixAdd: 0,2

|    |    |           |    |    |
|----|----|-----------|----|----|
| 23 | 96 | <u>18</u> | 4  | 64 |
| 45 | 40 | 18        | 44 | 34 |
| 92 | 13 | 77        | 71 | 12 |



|    |    |           |    |    |
|----|----|-----------|----|----|
| 70 | 73 | <u>66</u> | 79 | 39 |
| 91 | 75 | 73        | 99 | 47 |
| 27 | 64 | 21        | 34 | 1  |

i: 0  
j: 2



|    |     |           |  |  |
|----|-----|-----------|--|--|
| 93 | 169 | <u>84</u> |  |  |
|    |     |           |  |  |
|    |     |           |  |  |



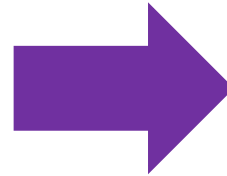
# matrixAdd: 0,3

|    |    |    |          |    |
|----|----|----|----------|----|
| 23 | 96 | 18 | <u>4</u> | 64 |
| 45 | 40 | 18 | 44       | 34 |
| 92 | 13 | 77 | 71       | 12 |



|    |    |    |           |    |
|----|----|----|-----------|----|
| 70 | 73 | 66 | <u>79</u> | 39 |
| 91 | 75 | 73 | 99        | 47 |
| 27 | 64 | 21 | 34        | 1  |

i: 0  
j: 3



|    |     |    |           |  |
|----|-----|----|-----------|--|
| 93 | 169 | 84 | <u>83</u> |  |
|    |     |    |           |  |
|    |     |    |           |  |



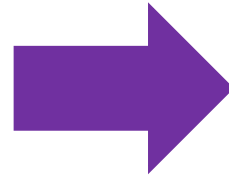
# matrixAdd: 0,4

|    |    |    |    |           |
|----|----|----|----|-----------|
| 23 | 96 | 18 | 4  | <u>64</u> |
| 45 | 40 | 18 | 44 | 34        |
| 92 | 13 | 77 | 71 | 12        |



|    |    |    |    |           |
|----|----|----|----|-----------|
| 70 | 73 | 66 | 79 | <u>39</u> |
| 91 | 75 | 73 | 99 | 47        |
| 27 | 64 | 21 | 34 | 1         |

i: 0  
j: 4



|    |     |    |    |            |
|----|-----|----|----|------------|
| 93 | 169 | 84 | 83 | <u>103</u> |
|    |     |    |    |            |
|    |     |    |    |            |



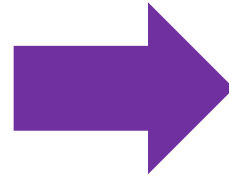
# matrixAdd: 1,0

|           |    |    |    |    |
|-----------|----|----|----|----|
| 23        | 96 | 18 | 4  | 64 |
| <u>45</u> | 40 | 18 | 44 | 34 |
| 92        | 13 | 77 | 71 | 12 |



|           |    |    |    |    |
|-----------|----|----|----|----|
| 70        | 73 | 66 | 79 | 39 |
| <u>91</u> | 75 | 73 | 99 | 47 |
| 27        | 64 | 21 | 34 | 1  |

i: 1  
j: 0



|            |     |    |    |     |
|------------|-----|----|----|-----|
| 93         | 169 | 84 | 83 | 103 |
| <u>136</u> |     |    |    |     |
|            |     |    |    |     |



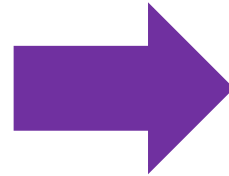
# matrixAdd: 1,1

|    |           |    |    |    |
|----|-----------|----|----|----|
| 23 | 96        | 18 | 4  | 64 |
| 45 | <u>40</u> | 18 | 44 | 34 |
| 92 | 13        | 77 | 71 | 12 |



|    |           |    |    |    |
|----|-----------|----|----|----|
| 70 | 73        | 66 | 79 | 39 |
| 91 | <u>75</u> | 73 | 99 | 47 |
| 27 | 64        | 21 | 34 | 1  |

i: 1  
j: 1



|     |            |    |    |     |
|-----|------------|----|----|-----|
| 93  | 169        | 84 | 83 | 103 |
| 136 | <u>115</u> |    |    |     |
|     |            |    |    |     |



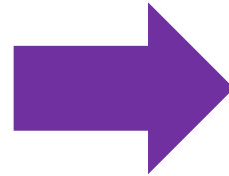
# matrixAdd: 1,2

|    |    |           |    |    |
|----|----|-----------|----|----|
| 23 | 96 | 18        | 4  | 64 |
| 45 | 40 | <u>18</u> | 44 | 34 |
| 92 | 13 | 77        | 71 | 12 |



|    |    |           |    |    |
|----|----|-----------|----|----|
| 70 | 73 | 66        | 79 | 39 |
| 91 | 75 | <u>73</u> | 99 | 47 |
| 27 | 64 | 21        | 34 | 1  |

i: 1  
j: 2



|     |     |           |    |     |
|-----|-----|-----------|----|-----|
| 93  | 169 | 84        | 83 | 103 |
| 136 | 115 | <u>91</u> |    |     |
|     |     |           |    |     |



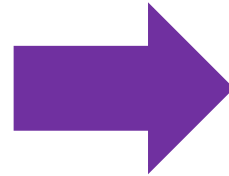
# matrixAdd: 1,3

|    |    |    |           |    |
|----|----|----|-----------|----|
| 23 | 96 | 18 | 4         | 64 |
| 45 | 40 | 18 | <u>44</u> | 34 |
| 92 | 13 | 77 | 71        | 12 |



|    |    |    |           |    |
|----|----|----|-----------|----|
| 70 | 73 | 66 | 79        | 39 |
| 91 | 75 | 73 | <u>99</u> | 47 |
| 27 | 64 | 21 | 34        | 1  |

i: 1  
j: 3



|     |     |    |            |     |
|-----|-----|----|------------|-----|
| 93  | 169 | 84 | 83         | 103 |
| 136 | 115 | 91 | <u>143</u> |     |
|     |     |    |            |     |





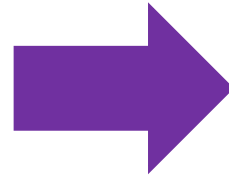
# matrixAdd: 1,4

|    |    |    |    |           |
|----|----|----|----|-----------|
| 23 | 96 | 18 | 4  | 64        |
| 45 | 40 | 18 | 44 | <u>34</u> |
| 92 | 13 | 77 | 71 | 12        |



|    |    |    |    |           |
|----|----|----|----|-----------|
| 70 | 73 | 66 | 79 | 39        |
| 91 | 75 | 73 | 99 | <u>47</u> |
| 27 | 64 | 21 | 34 | 1         |

i: 1  
j: 4



|     |     |    |     |           |
|-----|-----|----|-----|-----------|
| 93  | 169 | 84 | 83  | 103       |
| 136 | 115 | 91 | 143 | <u>81</u> |
|     |     |    |     |           |



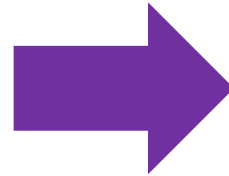
# matrixAdd: 2,0

|           |    |    |    |    |
|-----------|----|----|----|----|
| 23        | 96 | 18 | 4  | 64 |
| 45        | 40 | 18 | 44 | 34 |
| <u>92</u> | 13 | 77 | 71 | 12 |



|           |    |    |    |    |
|-----------|----|----|----|----|
| 70        | 73 | 66 | 79 | 39 |
| 91        | 75 | 73 | 99 | 47 |
| <u>27</u> | 64 | 21 | 34 | 1  |

i: 2  
j: 0



|            |     |    |     |     |
|------------|-----|----|-----|-----|
| 93         | 169 | 84 | 83  | 103 |
| 136        | 115 | 91 | 143 | 81  |
| <u>119</u> |     |    |     |     |



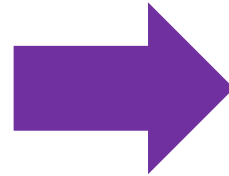
# matrixAdd: 2,1

|    |           |    |    |    |
|----|-----------|----|----|----|
| 23 | 96        | 18 | 4  | 64 |
| 45 | 40        | 18 | 44 | 34 |
| 92 | <u>13</u> | 77 | 71 | 12 |



|    |           |    |    |    |
|----|-----------|----|----|----|
| 70 | 73        | 66 | 79 | 39 |
| 91 | 75        | 73 | 99 | 47 |
| 27 | <u>64</u> | 21 | 34 | 1  |

i: 2  
j: 1



|     |           |    |     |     |
|-----|-----------|----|-----|-----|
| 93  | 169       | 84 | 83  | 103 |
| 136 | 115       | 91 | 143 | 81  |
| 119 | <u>77</u> |    |     |     |



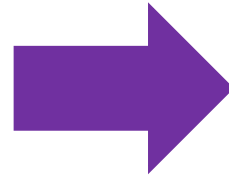
# matrixAdd: 2,2

|    |    |           |    |    |
|----|----|-----------|----|----|
| 23 | 96 | 18        | 4  | 64 |
| 45 | 40 | 18        | 44 | 34 |
| 92 | 13 | <u>77</u> | 71 | 12 |



|    |    |           |    |    |
|----|----|-----------|----|----|
| 70 | 73 | 66        | 79 | 39 |
| 91 | 75 | 73        | 99 | 47 |
| 27 | 64 | <u>21</u> | 34 | 1  |

i: 2  
j: 2



|     |     |           |     |     |
|-----|-----|-----------|-----|-----|
| 93  | 169 | 84        | 83  | 103 |
| 136 | 115 | 91        | 143 | 81  |
| 119 | 77  | <u>98</u> |     |     |



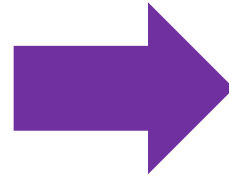
# matrixAdd: 2,3

|    |    |    |           |    |
|----|----|----|-----------|----|
| 23 | 96 | 18 | 4         | 64 |
| 45 | 40 | 18 | 44        | 34 |
| 92 | 13 | 77 | <u>71</u> | 12 |



|    |    |    |           |    |
|----|----|----|-----------|----|
| 70 | 73 | 66 | 79        | 39 |
| 91 | 75 | 73 | 99        | 47 |
| 27 | 64 | 21 | <u>34</u> | 1  |

i: 2  
j: 3



|     |     |    |            |     |
|-----|-----|----|------------|-----|
| 93  | 169 | 84 | 83         | 103 |
| 136 | 115 | 91 | 143        | 81  |
| 119 | 77  | 98 | <u>105</u> |     |



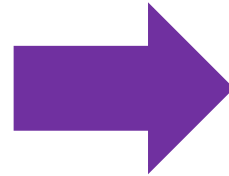
# matrixAdd: 2,4

|    |    |    |    |           |
|----|----|----|----|-----------|
| 23 | 96 | 18 | 4  | 64        |
| 45 | 40 | 18 | 44 | 34        |
| 92 | 13 | 77 | 71 | <u>12</u> |



|    |    |    |    |          |
|----|----|----|----|----------|
| 70 | 73 | 66 | 79 | 39       |
| 91 | 75 | 73 | 99 | 47       |
| 27 | 64 | 21 | 34 | <u>1</u> |

i: 2  
j: 4



|     |     |    |     |           |
|-----|-----|----|-----|-----------|
| 93  | 169 | 84 | 83  | 103       |
| 136 | 115 | 91 | 143 | 81        |
| 119 | 77  | 98 | 105 | <u>13</u> |

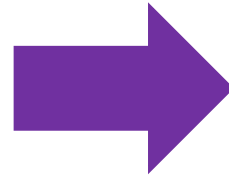


# matrixAdd: finished!

|    |    |    |    |    |
|----|----|----|----|----|
| 23 | 96 | 18 | 4  | 64 |
| 45 | 40 | 18 | 44 | 34 |
| 92 | 13 | 77 | 71 | 12 |



|    |    |    |    |    |
|----|----|----|----|----|
| 70 | 73 | 66 | 79 | 39 |
| 91 | 75 | 73 | 99 | 47 |
| 27 | 64 | 21 | 34 | 1  |



|     |     |    |     |     |
|-----|-----|----|-----|-----|
| 93  | 169 | 84 | 83  | 103 |
| 136 | 115 | 91 | 143 | 81  |
| 119 | 77  | 98 | 105 | 13  |



# readData: processing input

How many days' data would you like to input? 3

Next day's data:

Temperature in Seattle? 44

Temperature in Tacoma? 40

Temperature in Bothell? 43

Next day's data:

Temperature in Seattle? 42

Temperature in Tacoma? 40

Temperature in Bothell? 44

Next day's data:

Temperature in Seattle? 42

Temperature in Tacoma? 41

Temperature in Bothell? 43

...





# readData: days



How many days' data would you like to input? 3

Next day's data:

Temperature in Seattle?

Temperature in Tacoma?

Temperature in Bothell?

Next day's data:

Temperature in Seattle?

Temperature in Tacoma?

Temperature in Bothell?

Next day's data:

Temperature in Seattle?

Temperature in Tacoma?

Temperature in Bothell?

...



|   | Seattle | Tacoma | Bothell |
|---|---------|--------|---------|
| 1 |         |        |         |
| 2 |         |        |         |
| 3 |         |        |         |

# readData: 1, Seattle

How many days' data would you like to input? 3

Next day's data:

Temperature in Seattle? 44

Temperature in Tacoma?

Temperature in Bothell?

Next day's data:

Temperature in Seattle?

Temperature in Tacoma?

Temperature in Bothell?

Next day's data:

Temperature in Seattle?

Temperature in Tacoma?

Temperature in Bothell?

...

|   | Seattle | Tacoma | Bothell |
|---|---------|--------|---------|
| 1 | 44      |        |         |
| 2 |         |        |         |
| 3 |         |        |         |



# readData: 1, Tacoma

How many days' data would you like to input? 3

Next day's data:

Temperature in Seattle? 44

Temperature in Tacoma? 40

Temperature in Bothell?

Next day's data:

Temperature in Seattle?

Temperature in Tacoma?

Temperature in Bothell?

Next day's data:

Temperature in Seattle?

Temperature in Tacoma?

Temperature in Bothell?

...

|   | Seattle | Tacoma | Bothell |
|---|---------|--------|---------|
| 1 | 44      | 40     |         |
| 2 |         |        |         |
| 3 |         |        |         |



# readData: 1, Bothell

How many days' data would you like to input? 3

Next day's data:

Temperature in Seattle? 44

Temperature in Tacoma? 40

Temperature in Bothell? 43

Next day's data:

Temperature in Seattle?

Temperature in Tacoma?

Temperature in Bothell?

Next day's data:

Temperature in Seattle?

Temperature in Tacoma?

Temperature in Bothell?

...

|   | Seattle | Tacoma | Bothell |
|---|---------|--------|---------|
| 1 | 44      | 40     | 43      |
| 2 |         |        |         |
| 3 |         |        |         |



# readData: 2, Seattle

How many days' data would you like to input? 3

Next day's data:

Temperature in Seattle? 44

Temperature in Tacoma? 40

Temperature in Bothell? 43

Next day's data:

Temperature in Seattle? 42

Temperature in Tacoma?

Temperature in Bothell?

Next day's data:

Temperature in Seattle?

Temperature in Tacoma?

Temperature in Bothell?

...

|   | Seattle | Tacoma | Bothell |
|---|---------|--------|---------|
| 1 | 44      | 40     | 43      |
| 2 | 42      |        |         |
| 3 |         |        |         |



# readData: 2, Tacoma

How many days' data would you like to input? 3

Next day's data:

Temperature in Seattle? 44

Temperature in Tacoma? 40

Temperature in Bothell? 43

Next day's data:

Temperature in Seattle? 42

Temperature in Tacoma? 40

Temperature in Bothell?

Next day's data:

Temperature in Seattle?

Temperature in Tacoma?

Temperature in Bothell?

...

|   | Seattle | Tacoma | Bothell |
|---|---------|--------|---------|
| 1 | 44      | 40     | 43      |
| 2 | 42      | 40     |         |
| 3 |         |        |         |



# readData: 2, Bothell

How many days' data would you like to input? 3

Next day's data:

Temperature in Seattle? 44

Temperature in Tacoma? 40

Temperature in Bothell? 43

Next day's data:

Temperature in Seattle? 42

Temperature in Tacoma? 40

Temperature in Bothell? 44

Next day's data:

Temperature in Seattle?

Temperature in Tacoma?

Temperature in Bothell?

...

|   | Seattle | Tacoma | Bothell |
|---|---------|--------|---------|
| 1 | 44      | 40     | 43      |
| 2 | 42      | 40     | 44      |
| 3 |         |        |         |



# readData: 2, Seattle

How many days' data would you like to input? 3

Next day's data:

Temperature in Seattle? 44

Temperature in Tacoma? 40

Temperature in Bothell? 43

Next day's data:

Temperature in Seattle? 42

Temperature in Tacoma? 40

Temperature in Bothell? 44

Next day's data:

Temperature in Seattle? 42

Temperature in Tacoma?

Temperature in Bothell?

...

|   | Seattle | Tacoma | Bothell |
|---|---------|--------|---------|
| 1 | 44      | 40     | 43      |
| 2 | 42      | 40     | 44      |
| 3 | 42      |        |         |





# readData: 2, Tacoma

How many days' data would you like to input? 3

Next day's data:

Temperature in Seattle? 44

Temperature in Tacoma? 40

Temperature in Bothell? 43

Next day's data:

Temperature in Seattle? 42

Temperature in Tacoma? 40

Temperature in Bothell? 44

Next day's data:

Temperature in Seattle? 42

Temperature in Tacoma? 41

Temperature in Bothell?

...

|   | Seattle | Tacoma | Bothell |
|---|---------|--------|---------|
| 1 | 44      | 40     | 43      |
| 2 | 42      | 40     | 44      |
| 3 | 42      | 41     |         |



# readData: 2, Bothell

How many days' data would you like to input? 3

Next day's data:

Temperature in Seattle? 44

Temperature in Tacoma? 40

Temperature in Bothell? 43

Next day's data:

Temperature in Seattle? 42

Temperature in Tacoma? 40

Temperature in Bothell? 44

Next day's data:

Temperature in Seattle? 42

Temperature in Tacoma? 41

Temperature in Bothell? 43

...

|   | Seattle | Tacoma | Bothell |
|---|---------|--------|---------|
| 1 | 44      | 40     | 43      |
| 2 | 42      | 40     | 44      |
| 3 | 42      | 41     | 43      |



# computeAverages

How many days' data would you like to input? 3

...

The average values for each location were  
[42.666666666666664, 40.333333333333336,  
43.333333333333336]

|   | Seattle | Tacoma | Bothell |
|---|---------|--------|---------|
| 1 | 44      | 40     | 43      |
| 2 | 42      | 40     | 44      |
| 3 | 42      | 41     | 43      |



|        |        |        |
|--------|--------|--------|
| 42.667 | 40.333 | 43.333 |
|--------|--------|--------|

Average of Seattle  
temperatures  
 $(44 + 42 + 42) / 3$

