Lecture 5

Arrays and Tables

MATH1401

Fall 2021

Class Checklist

- **Homework 1 – Due Date** : Friday 9/3 – 5 PM
  - Graded Questions : 1.1, 2.1,2.1.1, 2.2, 3.1-3.3, 4.1-4.3, 5.1-5.4, 7.1
- **Lab 2** – Thursday: 9/9

- **Quiz 3** – Thursday: 9/2 – Covers Chapter 4
- **Quiz 4** – Tuesday: 9/7 – Covers Chapter 5

Review

Lecture 4 Review

- int/floats
- strings
- bools
- comparisons

Overview

Lecture 5 - Checklist

- Arrays
- Array Methods
- Array Functions
- Ranges
- Tables and Arrays

Lecture 4 Checklist - Programming

- Declare an Array
- Array Operations - +,-,*,**
- Be able to use array functions: **np.sum(), np.average(), np.count_nonzero(),len()**
- Be able to use array methods: **array.item()**
- Be able to declare a long array using np.range()
- Create a table and read a table

Arrays

Arrays

An array contains a sequence of values

- To make an array use **`make_array`**(v1,v2,...,vk)
- All elements of an array should have the same type

`make_array`(1,2,3,4,5) – makes array
`make_array`(1,2,3,’4’,5) – produces unintended error

Arrays Operations

Operations **+,-,*,**** between arrays are defined

- Arrays must be the same length
- Operations are applied to each element individually

```
make_array(1,2,3)* make_array(4,5,6) =
                   make_array(4,10,18)
```

- An operation between a number and an array is well defined (Demo)

Array Functions

Arrays Access

Each value in an array has a position

- Positions begin at 0 and end at length -1

```
make_array(‘a’,’b’,’c’,’d’,’e’,’f’)
position     0   1   2   3   4   5
length of array 6
```

- Access a position using `array.item`(position)

Arrays Functions

Common functions include Average and Sum

- **`np.average`**(arrayhere) – finds the average of the elements in the array

- **`np.sum`**(arrayhere) – finds the sum of the elements in the array

- **`len`**(arrayhere) – finds the length of the array

Ranges

Ranges

A range is an array of consecutive numbers

- **`np.arange(end)`**:

  An array of increasing integers from 0 up to **`end`**
- **`np.arange(start, end)`**:

  An array of increasing integers from **`start`** up to **`end`**
- **`np.arange(start, end, step)`**:

  A range with **`step`** between consecutive values

The range always includes **`start`** but excludes **`end`**

Ways to create a table

- `Table.read_table(filename)` - reads a table from a spreadsheet
- `Table()` - an empty table

- and... `select, where, sort` and so on all create new tables

Example

(Demo)

Discussion Question

Use the table functions we learned this week to find the income bracket (“class”) that spent the highest percentage of their income on rent.