Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Student ID:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**PART A - Sets**

* Create a new Python project in PyCharm called Lab7
* Create a Python file called main.py which has a main function
* Create a Python file called utilities\_sets.py and implement the following functions**:**

|  |  |
| --- | --- |
| **Function** | **Description** |
| get\_total\_items(set1) | Returns the total number of items for the given set1 |
| display\_all\_items(set1) | Prints all the elements for the given set1 using iteration |
| add\_item(set1, item) | Adds the given item to the set |
| remove\_item(set1, item) | Removes the given item from the set |
| get\_the\_union\_of(set1, set2) | Returns a set of the union of the given set1 and set2 |

* In your main function, create 2 sets with the following data

set 1 contains: apple, banana, orange, peach

set 2 contains: banana, pineapple, peach, watermelon

* Test each of your functions from step 3 and output the contents in a similar fashion as below:

“Added ‘cantaloupe’ to the set and the resulting set is”

apple

banana

orange

peach

cantaloupe

**PART B – Dictionaries**

* In your main function, create a dictionary of Canadian provinces and capital cities using:

<https://en.wikipedia.org/wiki/Provinces_and_territories_of_Canada>

* Use the Province name as the key and the capital city as the value
* Create a Python file called utilities\_dict.py and implement the following functions

|  |  |
| --- | --- |
| **Function** | **Description** |
| display\_all(this\_dict) | Displays all of the Keys and Values of the given this\_dict in a simple one sentence format  “x is the capital city of y” |
| get\_capital\_city(province\_name, this\_dict) | Returns the capital city for the given province\_name in the given this\_dict |
| add\_element(province\_name, capital\_city, this\_dict) | Adds the given key-value |
| remove\_item(province\_name, this\_dict) | Removes the given key from the dictionary |

* In your main function, test each one of the functions from step 3. Provide useful output so that we know the function works as expected. “The capital city of Alberta is Edmonton”

**PART C – Nested Dictionaries**

* In your main function, create a dictionary of Canadian province dictionaries. Use the values from the wiki page in part B and add each value as a dictionary like the following example

canada = {

"alberta" : { "capital" : "edmonton", "largest": "calgary", "population" : 3645257 },

}

* In the utilities\_dict.py file you created in Part B, implement the following functions

|  |  |
| --- | --- |
| **Function** | **Description** |
| get\_total\_population(this\_dict) | Returns the total population of this\_dict by summing up the population of each province. |
| get\_another\_capital\_city(province\_name, this\_dict) | Returns the name of the capital city for the given province\_name.  Return **None** if the province\_name doesn’t exist. |

|  |  |
| --- | --- |
| get\_largest\_city(province\_name, this\_dict) | Returns the name of the largest city for the given province\_name.  Return **None** if the province\_name doesn’t exist. |
| get\_smallest\_province(this\_dict) | Returns the name of the province with the smallest population. |
| get\_largest\_province(this\_dict) | Returns the name of the province with the largest population. |
| get\_province\_description(province\_name, this\_dict) | Returns a string description for the given province\_name. The format is as follows:  *Alberta has a population of 3645257 whose capital is Edmonton and largest city is Calgary.*  *Ontario has a population of 12851821 whose capital and largest city is Toronto.*  Return **None** if the province\_name doesn’t exist.  Note the following:   * The output is different if the province has same capital and largest city. * The first letter of the names of the province and cities is capitalized (think string methods). |

* In your main() function create a test for each of your functions from step 3. The output should be self-explanatory. For example:

“The total population of all provinces in Canada is 33476688”

* Zip up your project and your screenshot and upload it to the Learning Hub