MAT2440 Module 3 – List Comprehensions and Sets.

Objectives: Understand how use list comprehensions and perform set operations.

1. Create a new trinket titled "2440 Module 3" to begin today's activities. Type all of today's work into this trinket.

2. List Comprehensions:

    (a) A list comprehension allows you to create lists quickly using syntax that looks like set-builder notation

    ```
    a = [k*k for k in range(5)]
    b = [k for k in range(13) if k%2 == 0]
    ```

    The list `a` contains the squares of 0 to 4 and `b` contains all even numbers from 0 to 12.

3. Sets:

    (a) Sets are similar to lists, but they cannot have repeated entries and have special set operations:

    ```
    A = set([1,2,3,4,5])
    B = set([3,4,5,6,7])
    ```

4. Set Operations:

    (a) We can determine the membership of an element `x` in a set `A`:

    ```
    x in A
    ```

    (b) In the case of a finite set, we can compute its cardinality:

    ```
    len(A)
    ```

    (c) We can determine if a set `A` is a subset of another set `B`:

    ```
    A.issubset(B)
    ```

    (d) Unions:

```
A.union(B)
```

(e) Intersection:

```
A.intersection(B)
```

(f) Set Differences:

```
A.difference(B)
```

5. Write code to do the following:

    (a) Use list comprehensions to create the following lists:

       i. The list of all of the odd numbers from 1 to 100.

      ii. The list of all letters in your name that are not 'e'. (Hint: a string can be iterated over.)

    (b) Suppose $A = \{4, 7, 8, 3, 2\}$ and $B = \{8, 7, 5s, 4\}$

       i. Compute $A \cap B$.

      ii. Compute $A \cup B$.

     iii. Compute $A - B$.

     iv. Compute $|A \cup B|$.