§9.0-9.6: Sets

- *HW07* *due today*

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CMPT14x
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Stonybrook M2 environment

- The Stonybrook M2 software is installed on TWU lab PCs (Start->Programs->Computing)
- Stonybrook orientation:
  http://twu.seanho.com/05fall/cmpt14x/stonybrook/
- Start with an empty project file:
  http://twu.seanho.com/05fall/cmpt14x/stonybrook/M2Project.sbp
- You can have multiple programs and libraries in one project; all modules in the same project can import from one another
- Create a new program module in this project:
  - File->New Module: Program module type

Addendum: Seeding with time()

- A common way to seed a pseudorandom number generator is to use the current time in seconds:

```
import time, random
random.seed(time.time())
random.random()
```

What's on for today (§9.0-9.6)

- Sets
  - Membership
  - Union
  - Intersection
  - Difference
  - Symmetric difference
- Implementing sets in Python
- Bitsets

Set operations

- A set is an unordered collection of items
- Set membership: test if an item is in the set
- Set union: A ∪ B:
  - Anything that's in either A or B
- Set intersection: A ∩ B:
  - Those items which are in both A and B
- Set difference: A – B (or A \ B):
  - Those in A but not in B
- Set symmetric difference: A ^ B:
  - Those in exactly one of A or B

Sets in Python

- Python doesn't have a special type for sets (M2 does), but sequences can be used like sets:

```
bagOfApples = [ 'Fuji', 'Gala', 'Red Delicious' ]
```

  - Add an apple to the bag:

```
bagOfApples += [ 'Rome' ]
```

    - (What would happen if you left out the brackets?)
    - Is this the same as set union?
  - Check if an apple is in the bag:

```
if 'Fuji' in bagofApples:
```

  - How to remove an apple from the bag?

Bitsets

- Another way to use sets in Python is to use the binary form of an integer to represent flags:
  - e.g., file permissions

```
readFlag = 1 << 2
writeFlag = 1 << 1
execFlag = 1 << 0
myPerms = readFlag | writeFlag# both read/write

if myPerms & readFlag:                # have read perm
```

- myPerms is called a bitset: it is a compact way of representing a set

Review of today (§9.0-9.6)

- Sets
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TODO items

- Lab06 due next week: ch7 choose one:
  - #22: word search
  - #32: pseudorandom plot
  - #37: matrix library
  - #43: secure encryption
- Quiz06 (ch7-8) next Mon
- CMPT140 Final ch1-8 next week: W-Th 25-26Oct