INFO1110 Final Exam Revision Notes

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Outline

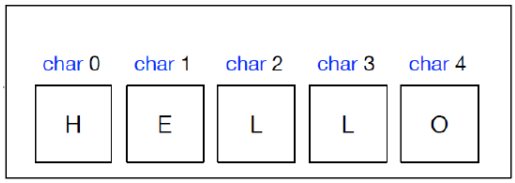
Python Basics (e.g. variables, statements)

Types of Variables can be:
String, Boolean, Integer, Float, List, Tuples, Dictionaries

String

To initialize a string variable, we use single quotes ' double quotes "

```
UnitCode = 'INFO1110'
Language = "Python"
message = """This unit trains students with software development process,
including skills of testing and debugging. """
message = "This unit trains students with software development process, \
including skills of testing and debugging. "
```



and triple quotes """ or ''' to denote literal strings.

Statements typically ends with a new line. If we use multi-line statements, we use \ like the above code.

Importantly, there are several operations you must know about string:
(string slices (index), split, replace, operations, format)

```
s = 'Learn Python'
print(s[1])
print(s[:6])
print(s[3:])
new_s = s.split(' ')
print(new_s)
```

```
new_s = s.replace('n','m')
print(new_s)
new_s *= 2
print(new_s)
new_s += '!!!'
print(new_s)
```

```
sem = 1
time = 'half'
print('We have learned coding for {} semester, i.e. {} of a year.'.format(sem,time))
```

More Formatting of string you may need to know:

```
nums = np.zeros(3, dtype=np.uint8)
print(nums)

n1 = np.zeros(6) # 1D array of length 3 all values 0
print(n1)
```

```
[0 0 0]
[0. 0. 0. 0. 0. 0.]
```

np.zeros(number) or np.zeros(number, dtype=...) gives you an array of zero. Dtype is optional, its default is np.float64.

```
nums = np.array([4396, -666, 23333, 1110], dtype = np.int32)

print(type(nums))
print(nums)
```

```
<class 'numpy.ndarray'>
[ 4396  -666 23333  1110]
```

np.array(object, dtype=...) is used to create an array. Dtype is optional as well.

See more examples below.

```
>>> np.array([1, 2, 3])
array([1, 2, 3])
```

```
>>> np.array([1, 2, 3.0])
array([ 1.,  2.,  3.])
```

This happens when dtype is not set.

When using uint8 dtype which has maximum of 255:

```
nums = np.array ([252,253,254,255,256,257] , dtype = np.uint8)
i = 0
while i < len(nums):
    nums[i] += 1
    i += 1
    print(nums)
```

```
[253 253 254 255   0   1]
[253 254 254 255   0   1]
[253 254 255 255   0   1]
[253 254 255   0   0   1]
[253 254 255   0   1   1]
[253 254 255   0   1   2]
```

```
nums = np.random.random(5).astype ('float64')
print(nums)
```

```
[0.51910645 0.56410163 0.19313186 0.60384721 0.39282849]

[0.06635407 0.87252999 0.17941049 0.90377169 0.61101615]

[0.4834744  0.91812263 0.62066298 0.0287349  0.17499245]
```

Np.random.random() gives you a float number in the range of [0.0, 1.0).

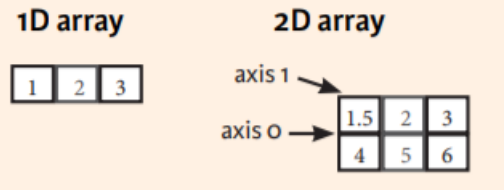
astype() is used to set dtype.

```
nums = np.linspace(2.0, 3.0, num=5)
print(nums)
```

np.linspace(start, stop, num) returns evenly spaced numbers over a specified interval. Num is optional, and its default is 50.

```
>>> np.array([[1, 2], [3, 4]])
array([[1, 2],
       [3, 4]])
```

This a 2D array.



Which of the following is a correct traversal? Or both are correct? Or neither is correct?

Class iterator and generator

Iteration is a general term for taking each item of something, one after another.
Class iterator is similar to list. Here's a quick look how we iterate elements in a list:

Difference: **iterable** and **iterator**

An **iterable** is an object that has an __iter__ method which returns an **iterator.** Thus, an iterable is an object that you can get an **iterator** from.
An **iterator** is an object with __next__ method.

Whenever you use a for loop, or map, or a list comprehension, etc. in Python, the __next__ method is called automatically to get each item from the iterator, thus going through the process of iteration.

```
# define a list
my_list = [0, 2, -1, 9]

# get an iterator using iter()
my_iter = iter(my_list)

## iterate through it using next()
print(next(my_iter))

print(next(my_iter))
## next(obj) is same as obj.__next__()

print(my_iter.__next__())
print(my_iter.__next__())

## This will raise error, no items left
next(my_iter)
```

```
0
2
-1
9

---------------------------------------------------------------------------
StopIteration                             Traceback (most recent call last)
<ipython-input-7-8fad4afbbcb9> in <module>()
     15
     16 ## This will raise error, no items left
---> 17 next(my_iter)

StopIteration:
```

Now, let's look at a Class Iterator Example.

```
class BoundedRepeater:
    def __init__(self, value, max_repeats):
        self.value = value
        self.max_repeats = max_repeats
        self.count = 0

    def __iter__(self):
        return self

    def __next__(self):
        if self.count >= self.max_repeats:
            raise StopIteration
        self.count += 1
        return self.value
```

```
repeater = BoundedRepeater('Hello', 3)
for item in repeater:
    print(item)
```

```
Hello
Hello
Hello
```

```
repeater = BoundedRepeater('Hello', 3)
iterator = iter(repeater)
while True:
    try:
        item = next(iterator)
    except StopIteration:
        break
    print(item)
```

```
Hello
Hello
Hello
```

For loop can do automatic __next__() as the code above. Use either __next__() or next() we can perform iteration.

Note: be careful with how you write __iter__() and __next__().