CS2023 Practice Final Exam

Python Language Questions

1. What is the maximum value for an integer type in Python 3?   *There is no limit in python 3*
2. What built-in collection types (i.e, list, tuple, set, dictionary, string) are mutable?   *list, dictionary, set*
3. What built-in collection types (i.e, list, tuple, set, dictionary, string) are ordered?   *all of them*
4. What built-in collection types (i.e, list, tuple, set, dictionary, string) allow duplicate members?   *List, dictionary value not key, tuple*
5. What built-in collection types (i.e, list, tuple, set, dictionary, string) can be used in for-in loop?   *All of them*
6. When a function has no return statement, what value is returned?   *None*
7. What does the built-in function id() return, and how can you use it to determine if a name is an alias?   *will display an id number, numbers will match*
8. What is a lambda expression in Python   *a temporary function*
9. What (3-letter) function xxx would you use to return the value -2 in the following expression:
>>> xxx([-2, -1, 0, 1], key=lambda x: x*x)   *xxx = min*
-2
10. How are Python list like C-arrays? How are they not alike?   *alike:they both store sets, unlike: fixed size, preallocated memory*
11. What is an interface in Python?
12. How do you specify default arguments in a Python function?
13. How do you specify a function so that it can have an arbitrary number of arguments?
14. What is the difference between a positional argument and a keyword argument in a Python function call?
15. In Python how do you overload the addition operator '+' for a class.

OOP Questions

1. In OOP we use the parameter name self for the first argument of a constructor, because it is bound to the __object__
2. A set of shared attribute names, along with a specification of their behavior, which can be implemented in different classes is called __attributes__
3. What does the __init__ method do in a class definition?
4. If you had a class definition such as class MonsterTruck(Car): then is MonsterTruck a subclass of Car or visa versa?
5. In OOP to refer to an attribute of an object we use dot expressions of the form: <expression>.<name of attr>. Is it True or false that the <expression> a function call which returns an object which contains that attribute name?
6. Is it true that in Python, an object referencing a pair of objects can be constructed with lists or with functions?
7. Is it true that in Python we can define attributes at the class level and at the instance level?

8. Is it true that every python object that is an instance of a user-defined class has a unique identity?

9. Is it true that in Python that Class attributes defined in a class can not be accessed by object instance, but only via the class name.

Iterators

1. What methods do every iterator enjoy? iter and next
2. How does Python know that you have written a generator function? it uses yield and next statements
3. Consider the generator

```
def big(n):
    k = n
    while True: yield k; k += n
```

What is g and how does it behave for first few next calls ?
```
>>>g = big(n=7)
>>> next(g) ; next(g); next(g)
```
4. Recall what is sequence in python is. How does a sequence differ from an iterator?
5. True or False: A generator function can be recursive. true?

Trees

1. How many arguments does a tree constructor function tree() take? three
2. How would you traverse a tree and print out all values stored in the roots?
3. What is tree called when the branches are the empty list?
3. How would you write a deep copy function for a tree?
4. Given the following tree class definition:

```
class Tree:
    def __init__(self, root, branches=[]):
        self.root = root
        self.branches = branches
```

What does the following function aaa return given a tree tree1 as an argument?

```
def aaa(tree1):
    if tree1.branches == []: return tree1.root
    return  aaa(tree1.branches[-1])
```

Pandas

1. What is the difference between a Series and a DataFrame in Pandas?
2. What does the Pandas DataFrame method head() return?
3. What does the Pandas DataFrame method axes() return?

4. How does the Pandas method floordiv(10) modify the data frame?
5. How does the Pandas insert method modify a DataFrame?
6. How to do you generate a scatterplot using matplotlib?
7. How do you read a csv file into in a Pandas dataframe?

Machine Learning

1. True or False: Python's Numpy array perform computations as fast as C-arrays.
2. In machine learning, why do we need two data sets: a train set and a test set?
3. What are is the problem of classification? And how is the data typically presented?
4. True or False: In binary classification we require a target array that has exactly two possible values?
5. True or False: A decision tree is usually binary, but it need not be?
6. True or False: For training purposes it is better to choose a non-random training set.
7. Is it possible for a decision tree to perform better on the testing data then it does on the training data?
8. True or False: When using sklearn we train a classification model by calling the fit function using the training data as arguments?
9. True or False: When using sklearn we test a classification model by calling the fit function using the testing data as arguments?
10. What is the problem of regression? And how is the data typically presented?
11. What are 2 metrics used for measuring the quality of a linear regression?
12. What 2 values are returned by every linear regression estimator?
13. True or False: When using sklearn we train a model for linear regression by calling the fit function using the training data set for the arguments ?
14. True or False: When using sklearn we test a model for linear regression by calling the fit function using the testing data sets as arguments ?
15. How does multiple linear regression improve results over simple linear regression?
16. True or False: When a multiple linear regression returns a large positive coefficients for a feature, then that feature is positively correlated with the target value.