Data Structures (CS 1520) Lecture 1 Name:______________________

1. The `print` function has optional *keyword arguments* which can be listed last that modify it behavior. The `print` function syntax: `print(value,...,sep=' ',end='\n', file=sys.stdout)`

a) Predict the expected output of each of the following.

Program	Expected Output

`print('cat',5,'dog')`
`print()`
`print('cat',5,end='')`
`print(' horse')`
`print('cow')`	

Program	Expected Output
`print ('cat',5,'dog',end='#',sep='23')`	
`print ('cat',5,'dog',sep='23','horse')`	
`print ('cat',5,'dog',sep='>'*3)`	

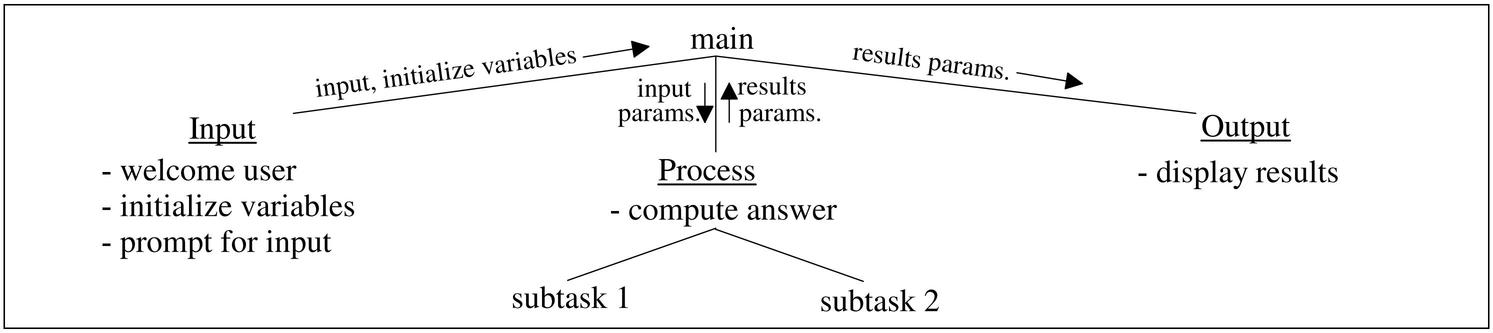
2. Review of assignment statements. Predict the output of the following programs:

```
a = 123
b = a
a += 1
print ('a is', a)
print ('b is', b)
```

```
c = ['cat', 'dog']
d = c
c.append('cow')
print('c is', c)
print('d is', d)
```

```
c = 'cat'
d = c
c += 'fish'
print('c is', c)
print('d is', d)
```

Most simple programs have a similar functional-decomposition design pattern (IPO - Input, Process, Output):



```
""" Simple IPO program to sum a list of numbers. """
def main():
    label, values = getInput()
    total = sum(values)
    displayResults(label, total)

def getInput():
    """ Get label and list of values to sum."""
    label = input("What are we summing? ")
    numberOfValues = int(input("How many values are there? "))
    values = []
    for i in range(numberOfValues):
        values.append(eval(input("Enter the next number: ")))
    return label, values

def displayResults(label, total):
    """ Display sum of values. """
    print("The sum of", label, "values is", total)

main()   # starts the main function running
```

```
What are we summing? money
How many values are there? 4
Enter the next number: 10
Enter the next number: 20
Enter the next number: 30
Enter the next number: 50
The sum of money values is 110
```

3. Design a program to roll two 6-sided dice 1,000 times to determine the percentage of each outcome (i.e., sum of both dice). Report the outcome(s) with the highest percentage.

a) Customize the diagram for the dice problem by briefly describing what each function does and what parameters are passed.

b) An alternative design methodology is to use object-oriented design. For the above dice problem, what objects would be useful and what methods (operations on the objects) should each perform?