

# CS8 Final Exam Study Guide and Sample Questions

## Study Guide

For the final exam, the topics you will be tested on include EVERYTHING we've done in class, homework, and lab assignments. A review of the previous study guides for Midterm #1 and #2 exams would be useful as well.

What follows are some sample questions to try out while studying.

Some of these may seem challenging. Take your time in your analysis. If you are asked to write a program (or code, in general), think of the problem at a high-level first (that is, think of it *algorithmically*) before you even attempt at writing code.

### Instructions: (Please read this)

- Read the questions carefully – make sure you understand what is being asked.
- Write out the answers by HAND FIRST. If you like, you can then check your answers by trying out the various codes on IDLE. Remember that, in the exam, you will have to present all your answers in WRITTEN form.
- Check your answers in the “Answers” section of this document.

### Questions:

1. What is the exact output of this Python code?

```
ucsb_classes = ['CS8', 'CS16', 'CS24', 'ECON1', 'COMM88',  
                'MATH3A', 'CHEM6A']  
  
l = []  
# Note that: chr(65) = 'A'  
for c in ucsb_classes:  
    if c[0] == chr(67):  
        l.append(c.lower() + "!")  
print(l)
```

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2. What is the exact output of this Python code?

```
n = 2
while (n < 15):
    print("The number", n)
    n += 7
```

3. What is the exact output of this Python code?

```
i = 0
j = 15
while (i < 5) and (j > 10):
    for k in range(1, 10, 3):
        s = "i = {:.2f}, j = {:.2f}, k = {:.2f}"
        print(s.format(i/2, j/2, k/2), end="**\n")
    i += 1
    j -= 5
```

4. What does this Python program print out?

```
def ThisThing(dnary):
    newd = {"original": 1}
    alist = (dnary.keys())
    for item in alist:
        newd[item + "*"] = dnary[item] + 1
    return newd

ThisOne = {"crepe": 3, "pho": 9, "tabbouli": 10, "roti": 9,
"guotie": 5}
print( ThisThing(ThisOne) )
```

5. Write a Python function, **Alter(s)** that takes a string **s** as a parameter and returns a string with alternating characters in the original string, starting with the 1<sup>st</sup> letter. For instance if **s="abcd"** then, **Alter(s)** becomes **"ac"** .
6. Write a Python function, **AddG(s)** that takes a string **s** as a parameter and returns a string with “g” after each character in the original string. For instance if **s="abcd"** then, **AddG(s)** becomes **"agbgcgdg"**.

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7. Write a Python function, **Multiply(L)** that takes a list **L** as a parameter and returns the product of all the elements in the list. Assume the list contains only integers. For instance if **alist=[2,3,4]**, then, **Multiply(alist)** returns **24**.
8. Based a little on #9 above, write a (as in ONE) Python function **Arithmetic(L, t)** that takes a list **L** and an integer **t** as parameters. Depending on the value of **t**, **Arithmetic** does different things:
  - a. If **t = 1**, then **Arithmetic** returns the product of all the elements in **L**.
  - b. If **t = 2**, then **Arithmetic** returns the sum of all the elements in **L**.
  - c. If **t = 3**, then **Arithmetic** returns the average of all the elements in **L**.
  - d. If **t** is neither of these, then **Arithmetic** prints “**Error!**” and returns **0**.You should ONLY have ONE return statement in this function!
9. Write a Python function, **CollectNames()**, that has no input arguments, and that asks users to input names of people that it will put in a list *that it returns*. Users will be continually asked for names until they enter “END”. The string “END” must not be placed in the list.

```
def CollectNames():  
    # Your code goes here  
    return alist
```

10. Write a Python function, **CollectNamesAges()**, that has no input arguments, and that asks users to input names of people AND their ages that it will put in a dictionary *that it returns*. Users will be continually asked for names until they enter “END”.  
For example:  
Please enter a name: **Jim**  
Please enter age for Jim: **30**  
Please enter a name: **END**

When they do so, the function will print out a message that says:

**“You have entered *N* names of people, whose average age is *A*”**

Where *N* is an integer number and *A* is a floating-point number with only 2 decimals showing after the point. The string “END” must not be placed in the list and must not be counted towards the number *N*.

11. Write a Python function, **makeDict(L)** that takes a list **L** as a parameter and returns a dictionary. The list contains only strings as elements. The dictionary keys are the elements of the list. The value of they keys are their corresponding length. For instance, if **alist=["abc", "cedar"]**, then, **makeDict(alist)** returns **{"abc":3, "cedar":5}**.

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12. Write a Python function, **Add(filename)** that takes an input file (**filename**) as a parameter and returns the sum of all the integers in the file. The file contains only one integer in each line.
13. Write a Python function, **Add(filename)** that takes a file (**filename**) as a parameter and returns the sum of all the numbers in the file. The file contains only a name of a person and two numbers separated by “|” in each line. The numbers can be either integers or floats, so the sum that’s returned has to be a float. For example, a single line in the file may look like this: **bryan|2|5.0**.
14. Write a **recursive** function in Python, **Series1(n)**, where **n** is a positive integer. **Series1(n)** will *return* the  $n^{\text{th}}$  element of series  $S_n$ . The infinite series  $S_n = 0, 1, 3, 7, 15, \dots$  etc..., for  $n = 0, 1, 2, 3, 4, \dots$  etc..., so for example, **Series1(3)** returns **7**. First figure out what the recursive formula is, i.e. how does  $S_n$  depend on  $S_{n-1}$ ? *Hint*: Try a linear relationship, i.e.  $S_n = A.S_{n-1} + B$ , where A and B are some constants.
15. Write a **non-recursive** function in Python, **Series2(n)**, that does the same exact thing as **Series1(n)** described above, but uses a for loop instead.
16. What does this Python code print out?

```
def reco(n):  
    if n <= 0:  
        return 1  
    return 2**reco(n-1)  
  
for i in range(4):  
    print(reco(i))
```

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**Answers:** NOTE that some of these answers are not unique, which means, particularly for the coding questions, there might be more than 1 way to solve these. As long as your answer is functionally correct AND you've only used instructions that we've covered in class, you'll get full credit on an exam.

1. ['cs8!', 'cs16!', 'cs24!', 'comm88!', 'chem6a!']
2. The number 2  
The number 9 (each on separate lines)
3.  $i = 0.00$ ,  $j = 7.50$ ,  $k = 0.50^{**}$   
 $i = 0.00$ ,  $j = 7.50$ ,  $k = 2.00^{**}$   
 $i = 0.00$ ,  $j = 7.50$ ,  $k = 3.50^{**}$  (each on separate lines)
4. {'original': 1, 'crepe\*': 4, 'pho\*': 10, 'tabbouli\*': 11, 'roti\*': 10, 'guotie\*': 6}
5. 

```
def Alter(s):  
    ns = ''  
    count = 0  
    for c in s:  
        if count%2 == 0:  
            ns += c  
        count += 1  
    return ns
```
6. 

```
def AddG(s):  
    ns = ''  
    for c in s:  
        ns += c + 'g'  
    return ns
```
7. 

```
def Multiply(L):  
    n = 1  
    for i in L:  
        n *= i  
    return n
```

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```
8. def Arithmetic(L, t):
    if t == 1:
        n = 1
        for i in L:
            n *= i
    elif t == 2:
        n = sum(L)
    elif t == 3:
        n = sum(L)/len(L)
    else:
        n = 0
        print("Error!")
    return n

9. def CollectNames():
    alist = []
    name = ""
    while (name != "END"):
        name = input("Please enter a name: ")
        if name != "END":
            alist.append(name)
    return alist

10. def CollectNamesAges():
    D = {}
    count = 0
    agesum = 0
    name = ""

    while (name != "END"):
        name = input("Please enter a name: ")
        if name != "END":
            age = int(input("Please enter age for "+name+": "))
            D[name] = age
            count += 1
            agesum += age

    average = agesum/count
    f = "You have entered {0} names of people, whose average
age is {1:0.2f}"
    print (f.format(count, average))

    return D
```

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11. 

```
def makeDict(L):  
    D = {}  
    for item in L:  
        D[item] = len(item)  
    return D
```
12. 

```
def Add(filename):  
    infile = open(filename, 'r')  
    n = 0  
    for i in infile:  
        n += i  
    infile.close()  
    return n
```
13. 

```
def Add2(filename):  
    infile = open(filename, 'r')  
    n = 0  
    lines = infile.readlines()  
    for line in lines:  
        L = line.split('|')  
        num1 = float(L[1])  
        num2 = float(L[2])  
        n += (num1 + num2)  
    infile.close()  
    return n
```
14. 

```
def Series1(n):  
    if n == 0:  
        return 0  
    else:  
        return (2 * Series1(n - 1) + 1)
```
15. 

```
def Series2(n):  
    if n == 0:  
        return 0  
    else:  
        s = 0  
        for i in range(1, n + 1):  
            s = 2*s + 1  
    return s
```
16. 

```
1  
2  
4  
16
```

 (each on a separate line)