

CS177
MIDTERM 2
PRACTICE EXAM
SOLUTION

Name: _____

Student ID: _____

This practice exam is due the day of the midterm 2 exam. The solutions will be posted the day before the exam but we encourage you to look at the solutions only after you have tried to solve the exam first.

Problem	Max	Current
1.	10	
2.	10	
3.	10	
4.	10	
5.	10	
6.	10	
7.	10	
8.	10	
9.	10	
10.	10	
	Total:	

1. Given the initial statements:

```
s1 = "spam"  
s2 = "ni!"
```

Show a python expression that could construct each of the following results by performing string operations on s1 and s2.

(a) "NI!"

```
s2.upper()
```

(b) "ni!spamni!"

```
s2+s1+s2
```

(c) "Spam Ni! Spam Ni! Spam Ni!"

```
s3= s1[0].upper()+s1[1:]  
s4 = s2[0].upper()+s2[1:]
```

```
(s3+" "+s4)*3
```

(d) "spam"

```
s1
```

(e) ["sp", "m"]

```
[s1[0:2],s1[-1]]
```

(f) "spm"

```
s1[0:2]+s1[-1]
```

2.

The following is a (silly) decision structure:

```
a,b,c = eval(input('Enter three numbers: '))
if a > b:
    if b > c:
        print("Spam Please!")
    else:
        print("It's a late parrot!")

elif b > c:
    print("Cheese Shoppe")
    if a >= c:
        print("Cheddar")
    elif a < b:
        print("Gouda")
    elif c == b:
        print("Swiss")
else
    print("Trees")
    if a == b:
        print("Chestnut")
    else:
        print("Larch")
print("Done")
```

Show the output that would result from each of the following possible inputs:

(a) 3,4,5

Trees
Larch
Done

(b) 3,3,3

Trees
Chestnut
Done

(c) 5,4,3

Spam Please!
Done

(d) 3,5,2

Cheese Shoppe
Cheddar
Done

3. Write a while loop fragment that calculates the following values:

(a) Sum of the first n counting numbers: $1 + 2 + 3 + 4 + \dots + n$

```
sum = 0
i = 0
while i < n:
    sum = sum + i
    i = i + 1
```

(b) Sum of the first n odd numbers: $1 + 3 + 5 + \dots + 2n+1$

```
sum = 0
i = 0
while i < n:
    sum = sum + i* 2 + 1
    i = i + 1
```

4. Given the initial statements

```
s1 = [2,1,4,3]
s2 = ['c','a','b']
```

show the result of evaluating each of the following sequence expressions:

(a) $s1 + s2$

```
[2,1,4,3,'c','a','b']
```

(b) $3 * s1 + 2 * s2$

```
[2,1,4,3,2,1,4,3,2,1,3,4,'c','a','b','c','a','b']
```

(c) $s1[1]$

```
1
```

(d) $s1[1:3]$

```
[1,4]
```

(e) $s1 + s2[-1]$

```
Error ( int + string)
```

(f) $s1.sort()$

```
[1,2,3,4]
```

5. Answer the following short questions about classes, objects, and methods:

a) What Python reserved word starts a class definition?

`class`

b) In a method in a class, what is always the name of the first parameter?

`self`

c) Within a method definition the instance variable “x” could be accessed via which expression?

`self.x`

d) The term applied to hiding details inside class definitions is called?

`Encapsulation`

6. A certain CS professor gives 100 point exams that are graded on the scale 90-100:A, 80-89:B, 70-79:C, 60-69:D, <60:F. Write a program that accepts an exam score as input and prints out the corresponding grade.

Example input/output:

Exam Score: 86

Grade: B

```
def main():  
  
    n = eval(input("Exam Score:"))  
  
    g = ""  
    if n >= 90:  
        g = "A"  
    elif n >= 80:  
        g = "B"  
    elif n >= 70:  
        g = "C"  
    elif n >= 60:  
        g = "D"  
    else:  
        g = "F"  
  
    print("Grade:",g)  
  
main()
```

7. Write a program that reads a sentence entered by the user, and then it prints the number of words, and the average word length in the sentence.

Example Input/Output:

Sentence: Purdue University is in West Lafayette Indiana

Number of Words: 7

Average Length: 5.71

```
# words.py

def main():
    s = input("Sentence:")
    words = s.split(" ")

    print("words=", words)

    sum = 0
    for w in words:
        sum = sum + len(w)

    print("Number of Words:", len(words))
    print("Average Length:", sum/len(words))

main()
```


8. A positive number $n > 2$ is prime if no number between 2 and $n-1$ evenly divides n . Write a program that accepts a value of n as input and determines if the value is a prime. If n is not prime, your program should quit as soon as it finds a value that evenly divides n .

Example input/output:

n? 17
17 is prime

n? 18
18 is not prime

```
def main():
    n = eval(input("n?"))
    p = True
    for i in range(2,n-1):
        if n % i == 0:
            p = False
            break
    if p:
        print(n, "is prime")
    else:
        print(n, "is not prime")

main()
```

9. Write a class to represent a cube. Your class should implement the following methods:

`__init__(self, side)` Creates a cube with a given “side” length.

`getSide(self)` Returns the “side” length of a cube.

`getSurfaceArea(self)` Returns the surface of a cube using the formula
 $\text{surface} = 6 * \text{side} * \text{side}$

`getVolume(self)` Returns the volume of a cube using the formula
 $\text{volume} = \text{side} * \text{side} * \text{side}$

```
class Cube:

    def __init__(self, side): # Creates a cube with a given “side” length.
        self.side = side

    def getSide(self): # Returns the “side” length of a cube.
        return self.side

    def getSurfaceArea(self): # Returns the surface of a cube using the formula
        area = 6 * self.side*self.side
        return area

    def getVolume(self): # Returns the volume of a cube using the formula
        volume = self.side * self.side *self.side
        return volume

def main():
    cube = Cube(10)
    area = cube.getSurfaceArea()
    volume = cube.getVolume()
    print("side=",cube.getSide(), "area=",area, "volume=", volume)

main()
```

10. A palindrome is a sentence that you can read the same from left to right and from right to left without regard of spaces or punctuation. For example, the following sentences are palindromes: “Never odd or even”, “Madam, I’m Adam”. Write a program that tells you if a sentence is a palindrome or not.

Example input/output:

Sentence? Never odd or even
It is a palindrome.
Do you want to continue? (yes/no) yes
Sentence? Hello world
It is not a palindrome.

```
#palindrome.py

def main():

    while True:
        s = input("Sentence?")

        # Remove punctuation and spaces
        # Iterate over all characters ch in s.
        # Add ch to s2 only if ch is a letter.
        #
        s2 = ""
        for ch in s:
            if ch.isalpha():
                s2 = s2 + ch

        s = s2

        # Convert s to lower case
        s = s.lower()

        print(s)

        # Obtain reverse
        r = ""
        for ch in s:
            r = ch + r

        # Compare reverse with s
        if s == r:
            print("It is a palindrome")
```

```
else:  
    print("It is not a palindrome.")  
  
yesno=input("Do you want to continue? (yes/no)")  
if yesno=="no":  
    break  
  
main()
```