THE UNIVERSITY OF WESTERN ONTARIO
LONDON, CANADA

Computer Science 1026a

MIDTERM EXAMINATION

OCTOBER 22, 2016

120 minutes

Name**:** **S O L U T I O N S**

Student Number:_____

Instructions (PLEASE READ):

- Fill in your name and student number above immediately.
- Have your student card out of its case and on the desk.
- For multiple choice and true/false questions, please circle the correct response on **this** exam paper.
- For short-answer questions, provide your answer in the space provided.
- This is a closed book exam
- If you finish within 10 minutes of the end of the exam, you must wait until the exam ends before leaving so as not to distract those who are still working.
- There is a blank page at the back of this exam for rough work. Additional sheets can be provided upon request. All paper must be returned to your instructor along with your exam.
- No electronic devices are allowed.
- **Please turn off your cell phone.**
- **DO NOT TURN THIS PAGE UNTIL DIRECTED TO DO SO**

Question	Out of	Mark
1. True/False	15	
2. Multiple Choice	15	
3. Short Answers	30	
4. Logic Errors	20	
5. A Little Code	20	
Total	100	

Question 1: True/False – 15 Marks (1 each)

For the following questions, please circle (or indicate as specified by the question) your answer directly on the exam sheet. Note that questions are each worth one point unless otherwise indicated.

1)	A variable in Python has a name and a location (memory).	**True**	False
2)	Python can have variables that are integers.	**True**	False
3)	Boolean variables can only have a value of true or false.	**True**	False
4)	Compilers translate byte code into source code	True	**False**
5)	The first position in a string in Python has the index 1.	True	**False**
6)	The symbol '#' is used in Python to indicate a constant.	True	**False**
7)	aBcD is a valid variable name in Python.	**True**	False
8)	2.3E04 is a floating number in Python	**True**	False
9)	The keyword **def** is used to define a function in Python	**True**	False
10)	The assignment operator in Python is **=**	**True**	False
11)	To divide two integers to get an integer result, you can use **//**	**True**	False
12)	The keyword **elseif** can be used in if-statements in Python.	True	**False**
13)	The operator **+** can be used to concatenate two strings together	**True**	False
14)	In Python, strings are mutable	True	**False**
15)	`25 % 7` produces the result `4.0`	True	**False**

Question 2: Multiple Choice – 15 Marks (1 each)

1) Which of the following statements is/are TRUE about the CPU?
   a. CPU stands for Central Processing Unit
   b. The CPU is what performs computation
   c. The CPU processes machine language
   d. <u>Two of the above statements are true</u>
   e. None of the above are true

2) Which of the following correctly lists the types of memory from slowest to fastest?
   a. Hard disk, Registers, RAM
   b. <u>Hard disk, RAM, Registers</u> ***(either)***
   c. External, Internal, CPU
   d. <u>External, Internal, RAM</u>

3) Which of the following are valid assignment statements in Python:
   a. <u>n = 3</u>
   b. x + y = 0
   c. z == 3.24
   d. All of the above.
   e. None of the above.

4) Which of the following adds two variables, x and y, together, divides their sum by 3 and adds 11 to the result:
   a. (x + y + 11) / 3
   b. (x + y) / (3 + 11)
   c. x + y /3 + 11
   d. <u>((x + y) / 3) + 11</u>
   e. None of the above are true

5) What will be the values of the variables num1 and num2 after the execution of the following assignments?

```
num1 = 20
num2 = 10
num1 = num1 + num2 / 2
num2 = num1
```

   a. num1 is 20, num2 is 10
   b. num1 is 15, num2 is 10
   c. num1 is 25, num2 is 10
   d. <u>num1 is 25, num2 is 25</u>
   e. None of the above.

Consider the following code for the next two questions:

```
num1 = int(input("Enter a number: "))
num2 = int(input("Enter a number: "))
```

```
num3 = int(input("Enter a number: "))
if num1 > num2 :
  if num1 > num3 :
    print(num1)
  else :
    print(num3)
else :
  if num2 > num3 :
    print(num2)
  else :
    print(num3)
```

6) Assuming that a user enters 30, 20, and 10 as the input values in that order to the code above, what is the output?

a. 30
b. 20
c. 10
d. 30 and 20
e. Nothing, there is an error.

7) If the user enters, 10, 20, 30 as the input to the code above in that order, what is the output?
a. 10
b. 20
c. 30
d. 10 and 30
e. Nothing, there is an error.

8) The following code snippet contains an error. What is the error?

```
cost = int(input("Enter the cost: "))
if cost > 100
   cost = cost - 10
print("Discounted cost:", cost)
```

a. Logical error: use of an uninitialized variable
b. Syntax error: missing colon after if statement
c. Syntax error: missing an else statement
d. Syntax error: incorrect indentation

9) Consider the following code segment:

```
total = 0
for x in range (100) :
    total = total + x;
```

Which of the following best describes what will happen if we run this code?

a. It will sum all the integers between 1 and 100.
b. It will not execute the loop.
c. It will enter an infinite loop.
d. <u>It will sum all the integers from 0 to 99.</u>
e. It will sum all the odd numbers from 2 to 99.

10) Which of the following `for loops` will run the loop body 5 times?

a. `for i in range(14, 10, -1) :`
b. <u>`for i in range(15, 10, -1) :`</u>
c. `for i in range(15, 11, -1) :`
d. `for i in range(16, 10, -1) :`

11) Which of the following checks to see if there is a comma anywhere in the string variable `name`?

a. `if name.contains(",") :`
b. `if "," not in name :`
c. <u>`if "," in name :`</u>
d. `if name.startswith(",") :`

12) Is the code snippet written below legal?

```
s = "1234"
for i in range (0, 4) :
   print(s[i], s[i + 1])
```

a. Yes.
b. No; there should not be a colon at the end of line 2.
c. <u>No; `for i = 3, s[i + 1]` will result in an string index out of range error.</u>
d. No; `for i = 0, s[i]` will result in an string index out of range error

13) Which of the following statements is true about functions and strings:

a. A function can be called with a string as an argument.
b. A function can return a string.
c. Only a. is true.
d. Only b. is true.
e. <u>Both a. and b. are true.</u>

14) What would `print("%.4f" % 789.450123)` output:

a. `.4501`
b. `789.4`
c. `789.450123`
d. <u>`789.4501`</u>
e. None of the above

15) What does the following code snippet output?

```
a= 7
b= 8
def fun(b,a):
    a=9
    b=8
    return a

fun(a,b)
print(a,b)
```

a. 7 8

b. 8 9

c. 9 9

d. 8 8

e. None of the above

Question 3: Short Answers – 30 Marks (2 each)

1) Review the code snippet below:

```
maritalStatus = input("Enter your marital status (s for single, m for married): ")
maritalStatus = maritalStatus.upper()
```

Write an if statement that can be used to validate whether the user entered a valid marital status?

If maritalStatus == "S" or maritalStatus == "M" :
--- do not need to include a "print" statement

Or

If maritalStatus != "S" and maritalStatus != "M" :

2) What is the output of the code snippet given below?

```
s = "abcde"
length = len(s)
i = 1
while i < length :
   print(s[length - i])
   i = i + 1
```

e
d
c
b

3) What is printed by the following code snippet?

```
name = "today is thursday"
name = name.replace("i", "#")
name.upper()
print(name)
```

today #s thursday

4) What is printed to the screen when this loop executes?

```
for i in range(20, 2, -6) :
   print(i, end = "-")
```

20-14-8

5) What is the **last** output line of the code snippet given below?

```
for i in range(3) :
  for j in  range(5) :
    if i % 2 ==  j % 2 :
      print("i")
    else :
      print("j")
```

i

6. Consider the following code segment:

```
if a < b and a < c:
   print("W")
else :
   print("X")
   if b == c :
     print("Y")
   elif b < c:
     print("Z")
   else:
    print("Q")
```

Give examples of values for a, b and c will cause the code to print both 'X' and 'Y'?

a > b and b == c, so for example: a=2, b=1, c=1

7. Consider the code segment in question 6) (above). Give examples of values for a, b and c will cause the code to print both 'X' and 'Z':

a > b and b < c, so for example: a=10, b=1, c=2

8. The following program is supposed to sum all of the numbers entered by the user. What line of code must be inserted in the blank so that the program will achieve this goal?

```
total = 0.0
inputStr = input("Enter a value: ")
while inputStr != "" :
  value = float(inputStr)

  _____
  inputStr = input("Enter a value: ")
```

total = total + value

9. Given the following code snippet, what are the final values stored in `str1` and `str3`?

```
str1 = "ABC"
str2 = "123"
str3 = str2*2
if str2.isdigit():
    str1 = "ab" + "551"
else:
    str1 = str2 + "BOAT"
```

str1 = ab551

str3 = 123123

10. The following code segment is supposed to get some number of input words from a user and then print a string with all of the words with dashes between them. For example, if the words are big, small, tiny then the program should display big-small-tiny.

```
nw = int(input("Enter the number of words:"))
result = ""
for i in range(nw):
   wrd = input("Enter word: ")
   if i > 0 :

      _____
   else:
      result = wrd
print(result)
```

What line of code should be placed in the blank to achieve this goal?

result = result + "-" + wrd

11. The following function, isDivisiblexy(n,x,y) checks to see if the value of n is evenly divisible by x *and* by y. If it is, it returns True, otherwise it returns False. It is missing part of the code; add the correct pieces of code to complete the function.

```
def isDivisiblexy(n,x,y):
  if _____ and _____ :
    return True
  else:
    return False
```

n % x == 0 n % y == 0

12. The following function cellgrowth(pop,rate,n) computes the growth of a population from an initial starting value pop. The rate of growth is the parameter rate and the n is the number of generations to be computed. Insert the parameters into the code to complete it.

```
def cellgrowth(pop,rate,n):
  gen = _____    pop
  for i in range(_____):    n
    gen = gen * (1.0+_____)   rate
  return gen
```

13. What is the output of the following code snippet.

```
def myCalculator(n):

 i = 10
 x = 4
 y = 2

 while i >= 0 and n >=5:
    y = y ** n
    x = n % 4 + y
    i = i-1
 return x

print( myCalculator(3) )
```

4

14. The following code segment makes use of `while` statement. Convert it into code that does the same thing but makes use of a `for` statement.

```
i = 0
j = 0
while i  < 125 :
  i = i + 2
  j = j + 1
  print(j)
```

for i in range(0,125,2) : -- 2 marks if all correct
** j=j+1 1 mark if only correct loop body**

15. Consider the following code segment. It is designed to identify the first location within a string, text where two adjacent characters are the same.

```
i = 1
found = False
while not found and i < len(text) :
  _____ :
    found = True
  else :
    i = i + 1
```

What line of code should be placed in the blank to achieve this goal?

if text[i-1] == text[i]

Question 4: Logic Errors - Correcting Code Segments – 20 Marks

1) The following code segment is supposed to convert a mark (an integer) to a "Pass" (60 and above), "Borderline" (50 to 59) or "Fail" (below) 50. The code as given is incorrect. Rewrite the code to fix it so that it will compute correctly. (6 Marks)

```
grade = int(input("Enter student grade: "))
if grade >= 60 :
  status = "Pass"
if grade >= 50 :
  status = "Borderline"
else :
  status = "Fail"
print(letterGrade)
```

Each 3 marks:
if grade >= 50 : → elif grade >= 50 :
print(letterGrade) → print(status)

(or equivalent)

2) The following code segment prompts the user for integers and computes the difference between consecutive integers entered; the program stops when the user enters 0. The program has three logic errors. Identify them and correct the lines of code that contain them. Note: a line may contain more than one logic error. (6 Marks)

	2 marks each
int1 = int(input("Enter first number: "))	
while int1 > 0:	should be **while int1 != 0**
int2 = int(input("Enter next number: "))	
diff = int1-int2	
print("Difference is: " + str(int2))	should be **"Difference is: " + str(diff)**
int2 = int1	should be **int1 = int2**

3) The following program should display to the screen the reverse of string or the capitalized version of the string. The program has a function myReverse that is supposed to return the reverse if the string if the length is longer than 5 and if not it should return the original string capitalized. The code is syntactically correct, but contains four logic errors. Identify them and correct the lines in which they occur. Note: a line may contain more than one logic error. *(8 Marks)*

```
def myReverse(str)
  outputStr = ""
  i = 1                              i = 0    (1 pt)

  if ( len(str) ) < 5 :              len(str) <= 5:  (1 pt)
     outputStr.upper()               outputStr = str.upper()    (2 points)
     return outputStr
  else:
    while i < len(str)  :
       outputStr = outputStr + str[i]    outputStr = str[i]  + outputStr    (2 points)
       i = i + 1
    print outputStr                 return outputStr    (2 points)

  inp = input('Enter the string to be reversed:')
  A =  myReverse(inp)
  print(A)
```

(or equivalent changes)

Question 5: A Little Code - 20 Marks

1) (8 marks) Write a function countZeros(n) that takes an integer n, and counts the number of zeros that it contains. For example, if the number was 100, then the function would return 2; if the number was 1023, then it would return 1; if the number was 1000, then it would return 3. Call this function twice and display the output.

```
def countZeros(n):
    strInt = str(n)
    count = 0
    for ch in strInt:
        if ch == '0':
            count = count + 1
    return count
```

or

```
def countZeros(n):
  return str(n).count('0')
```

```
print(countZeros(123400))
print(countZeros(10120))
```

(or equivalent)

2) (12 marks) Write a program that based on user input does the following
   a. If the user enters an integer value determine the sum of multiples of 5 between 2 and that number (inclusively)
   b. If the user enters a string that is not just numbers then determine how many characters are uppercase and how many are lowercase.

      For instance,
      If the user enters 20, your program should output
      The sum of multiples of 5 between 2 and 20 is 50
      If the user enters "Boy", your program should output
      The number of uppercase characters is 1
      The number of lowercase characters is 2

```
strInput = input('Please enter your input')
if strInput.isdigit():
    sum = 0
    for i in range(5, 1+ int(strInput), 5):
        sum = sum + i

    print('The sum of multiples of 5 between 2 and ', strInput,
"is", sum)
else:
    countUpper = 0
    countLower = 0
    for ch in strInput:
        if ch.isupper():
            countUpper = countUpper + 1
        elif ch.islower():
            countLower = countLower + 1

    print('The number of uppercase characters is ', countUpper)
    print('The number of lowercase characters is ', countLower)
```

(or equivalent)