Row:	SEAT:

MOCK FINAL EXAM CSci 127: Introduction to Computer Science Hunter College, City University of New York

Spring 2025

Exam Rules

- Show all your work. Your grade will be based on the work shown.
- The exam is closed book and closed notes with the exception of an 8 $1/2" \ge 11"$ piece of paper filled with notes, programs, etc.
- When taking the exam, you may have with you pens and pencils, and your note sheet.
- You may not use a computer, calculator, tablet, phone, earbuds, or other electronic device.
- Do not open this exam until instructed to do so.

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ASCII TABLE

Decimal	пех	Char	Dec
0	0	[NULL]	32
1	1	[START OF HEADING]	33
2	2	[START OF TEXT]	34
3	3	[END OF TEXT]	35
4	4	[END OF TRANSMISSION]	36
5	5	[ENQUIRY]	37
6	6	[ACKNOWLEDGE]	38
7	7	[BELL]	39
8	8	[BACKSPACE]	40
9	9	[HORIZONTAL TAB]	41
10	А	[LINE FEED]	42
11	В	[VERTICAL TAB]	43
12	С	[FORM FEED]	44
13	D	[CARRIAGE RETURN]	45
14	E	[SHIFT OUT]	46
15	F	[SHIFT IN]	47
16	10	[DATA LINK ESCAPE]	48
17	11	[DEVICE CONTROL 1]	49
18	12	[DEVICE CONTROL 2]	50
19	13	[DEVICE CONTROL 3]	51
20	14	[DEVICE CONTROL 4]	52
21	15	[NEGATIVE ACKNOWLEDGE]	53
22	16	[SYNCHRONOUS IDLE]	54
23	17	[ENG OF TRANS. BLOCK]	55
24	18	[CANCEL]	56
25	19	[END OF MEDIUM]	57
26	1A	[SUBSTITUTE]	58
27	1B	[ESCAPE]	59
28	1C	[FILE SEPARATOR]	60
29	ID	[GROUP SEPARATOR]	61
30	1E	[RECORD SEPARATOR]	62
31	16	[UNIT SEPARATOR]	63



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Turtles: Let t be	a turtle.			
Function	Description			
t.forward(x)	Move turtle forward x steps.			
t.backward(x)	Move turtle backward \mathbf{x} steps.			
t.left(x)/t.right(x)	Turn turtle left/right \mathbf{x} degrees.			
t.penup()/t.pendown()	Lift turtle's pen up/down.			
t.stamp()	Stamp at current location.			
t.goto(x,y)	Move turtle to (x,y).			

String Methods	Let s be a string.
Function	Description
len(s)	Returns the length of s .
s.lower()	Returns s as lower case characters.
s.upper()	Returns \mathbf{s} as upper case characters.
s.find(t)	Returns index of t in s (-1 not found).
s.split(d)	Splits s into list of strings on d.
s.join[lst]	Joins 1st into a string, by s.

cimal	Hex	Char	Decimal	Hex	Char	Decimal	Hex	Char
	20	[SPACE]	64	40	0	96	60	`
	21	1	65	41	Α	97	61	а
	22		66	42	В	98	62	b
	23	#	67	43	С	99	63	с
	24	\$	68	44	D	100	64	d
	25	%	69	45	E	101	65	е
	26	&	70	46	F	102	66	f
	27	1.00	71	47	G	103	67	g
	28	(72	48	H	104	68	ĥ
	29)	73	49	1	105	69	i
	2A	*	74	4A	J	106	6A	j
	2B	+	75	4B	κ	107	6B	k
	2C	,	76	4C	L	108	6C	1
	2D	-	77	4D	М	109	6D	m
	2E	100 C	78	4E	Ν	110	6E	n
	2F	1	79	4F	0	111	6F	0
	30	0	80	50	Ρ	112	70	р
	31	1	81	51	Q	113	71	q
	32	2	82	52	R	114	72	r i
	33	3	83	53	S	115	73	S
	34	4	84	54	Т	116	74	t
	35	5	85	55	U	117	75	u
	36	6	86	56	V	118	76	v
	37	7	87	57	W	119	77	w
	38	8	88	58	X	120	78	x
	39	9	89	59	Υ	121	79	V
	3A	1.00	90	5A	Z	122	7A	z
	3B	;	91	5B	[123	7B	{
	3C	<	92	5C	1	124	7C	1 - C
	3D	=	93	5D	1	125	7D	}
	3E	>	94	5E	^	126	7E	~
	ЗF	?	95	5F		127	7F	[DEL]
(Free	om_wiki	pedia com	mons)		_			-

Pandas: Let df be a DataFrame, s a Series, & pd the Pandas package.

D /:	D : /:
Function	Description
pd.read_csv(fn)	Returns a DataFrame with file fn.
pd.to_csv(fn)	Writes df to fn.
pd.DataFrame(d)	Returns DataFrame built from dictionary d.
df[col]	Returns col column as a Series.
df[[col1,col2]]	Returns DataFrame with col1 & col2.
df.columns	List of column names of df.
df.head(n)/df.tail(n)	First/last n lines of df.
df.plot(x=col)	Returns a figure with col as x-axis
fig.savefig(fn)	Writes fig to fn.
<pre>s.min()/s.max()/s.mean()</pre>	Returns min/max/average of s.
<pre>s.value_counts()</pre>	Counts $\#$ times each value occurs.
df.groupby(col)	Groups df by values in col.
Plotly Express: Let px	be the Plotly Express package.
Function	Description
longitude	Degrees east/west from -180 to 180.
latitude	Degrees north/south from -90 to 90.
$px.scatter_geo(df,)$	Returns outline map as fig. Keywords args:
	<pre>lon,lat,size,hover_name,projection,title.</pre>
$px.scatter_map(df,)$	Returns tiled map as fig. Keywords args:
	<pre>lon,lat,size,hover_name,title,zoom.</pre>
fig.show()	Displays map on browser.
fig.write_html(fn)	Writes fig to fn.
MIPS: Let rs, rt, & rd be	registers.
Encore the second secon	Description

Function	Description				
ADD rd, rs, rt	Adds values of rs and rt and stores in rd.				
ADDI rd, rs, imm	Adds values of rs and imm and stores in rd.				
SUB rd, rs, rt	Subtracts values of rs and rt and stores in rd.				
BEQ rs, rt, target	If registers $rs = rt$, jump to target.				
JUMP target	Jump to target.				
 UNIX:					
 Function	Description				
ls / ls -l / ls *.py	Lists files /lists long/lists matching pattern.				
cp x y / mv x y	Copies/renames file x to file y .				
pwd	Prints path to current directory.				
mkdir x	Creates directory called x.				
cd/ / cd /usr/bin	Changes directory via relative/absolute path.				
lswc -c /lsgrep pat	Uses pipes to count $\#$ of files/match pat				

1. (a) What will the following Python code print:

```
s = "SundayMondayTuesdayWednesdayThursdayFridaySaturday!!!"
num = s.count("day")
days = s.split("day")
print("There are", num, "days.")
print("Last element is", days[-1])
mess = days[0]
print("Weekends", mess, "and", days[-2])
short = [day[:3] for day in days[:-1]]
print("Weekdays:", short[1:6])
```

(b) Consider the following shell commands:

\$ ls			
hello.cpp	photos	pp_hello.py	work
\$ pwd			
/Users/csguest			

Assuming the commands below are run sequentially, what is the output after each has run:

i.	\$ \$	mv hello.cpp p1.cpp ls
ii.	\$ \$ \$	mkdir cprogs mv *.cpp cprogs ls
iii.	\$ \$	cd cprogs pwd
iv.	\$ \$ \$	mkdir p50_60 mkdir pp_5 ls grep pp

Output:		

Output:			

Output:

Output:

2. (a) Fill in the missing values in the table:

Decimal	Binary	Hexadecimal
3		3
	1011	В
34	100010	
254	11111110	

(b) Fill in the missing information to make the statements true: import turtle megan = turtle.Turtle() megan.color("#AAAAAA") ben = turtle.Turtle() i. is red. daniel turtle.colormode(1.0) ii. is purple. ben.color(0, seth = turtle.Turtle() is green. turtle.colormode(255) iii. ben seth.color(200, 0, 200) daniel = turtle.Turtle() iv. is gray. daniel.color("# ") is pink. v. blake = turtle.Turtle() turtle.colormode(255) blake.color(100, 0, 0) (c) Consider the code: bin_string = input("Enter a binary number:) 1 $dec_num = 0$ 2 for c in bin_string: 3 dec_num = dec_num * 2 4 if c == '1' 5 $dec_num = dec_num + 1$ 6 print(dec_num) 7 i. Circle the code above and mark line with (i) that caused this error: line 1: bin_string = input("Enter a binary number:) SyntaxError: unterminated string literal (detected at line 1) Write the code that would fix the error: ii. Box the code above and mark line with (ii) that caused this error: line 5: if c == '1' SyntaxError: expected ':' Write the code that would fix the error:

out =

out =

out =

3. (a) What is the value (True/False) of out:



(b) Fill in the values to yield the output:



(c) Design a circuit that implements the logical expression:(in1 and in2) or (in1 and in3) or (in2 and in3)

4. (a) Draw the output for the function calls:

```
import turtle
tia = turtle.Turtle()

def ramble(t, len, isNested):
    if len >= 10:
        for i in range(6):
            t.forward(len)
            t.left(60)
            if isNested:
            ramble(t,len/4,isNested)
```



(b) Given the function definition:

- i. What are the formal parameters of sorted()?
- ii. What is the return value of sorted()?
- iii. What is the output for sorted([20,10,0,5])?

ls[0]	ls[1]	ls[2]	ls[3]

iv. What is the output for sorted(["Isabel", "Makiya", "Georgina", "Calvin"])?

ls[0]	ls[1]	ls[2]	ls[3]

5. Design an algorithm that finds the finds the highest point from inputted elevation data. Your should ask the user for the name of a file containing a grid of numbers, corresponding to heights above sea level and loads it into a 2D array of integers. The algorithm should find the index (row, col) of the maximum number in the array.

Libraries:	
Input:	
Output:	

Design Pattern:

\Box Accumulator	\Box Max/Min \Box Fig	nding Duplicates \Box Sear	rching			
Principal Mechanisms (select all that apply):						
□ Single Loop □ Indexing/slicing	$\Box \text{ Nested Loop}$ $\Box \text{ Dictionary}$	$\begin{tabular}{ll} \square Conditional (if/else) \\ \square List Comprehension \end{tabular}$	□ Recursion □ Regular Expressions			
Process (as a concise and precise LIST OF STEPS / pseudocode):						
(Assume libraries have already been imported)						

(Assume libraries have already been imported.)

6. Fill in the Python code below for the function, duplicates(), that takes a list of names and returns a list with the names that occurred more than once.

```
def duplicates(names):
    """
    Takes a list of names and returns a list of the duplicate names
    @param names: a list of names
    @return: the names that occurred more than once
    """
```

#Set up an empty dictionary, called new_dict:

#Set up an empty list, called dup_names:

```
for name in names:
```

#Check if the name is in the dictionary:

#Increment the count:

#Check if it's occurred twice:

#Add it to the duplicate name list:

else:

#Create a new dictionary entry for name with value 1

#Return the duplicate name list:

- 7. Write a **complete Python program** that makes an interactive map using Plotly Express. Your program should ask the user for:
 - A list of place names,
 - A list of latitudes,
 - A list of longitudes, and
 - The name for the output (HTML) file.

and save the resulting map, with the entered place names as the hover text at the locations specified saved to the output file.

Hint: Build a DataFrame from the inputted lists and then use px to create & save the map.

8. (a) Consider the following MIPS program:

```
ADDI $s0, $zero, 2
ADD $s1, $s0, $s0
SUB $s2, $s1, $s0
ADD $s3, $s1, $s2
```

After the program runs, what is the value stored in:

\$s1 register	\$s2 register	\$s3 register

(b) Consider the MIPS code:

```
ADDI $sp, $sp, -5
1
   ADDI $t0, $zero, 80
\mathbf{2}
   ADDI $s2, $zero, 88
3
   SETUP: SB $t0, 0($sp)
4
   ADDI $sp, $sp, 1
\mathbf{5}
   ADDI $t0, $t0, 2
6
   BEQ $t0, $s2, DONE
\overline{7}
   J SETUP
8
   DONE: ADDI $t0, $zero, 0
9
   SB $t0, 0($sp)
10
   ADDI $sp, $sp, -5
^{11}
   ADDI $v0, $zero, 4
12
   ADDI $a0, $sp, 0
13
   syscall
14
```

i) How many letters are printed?	
ii) What is the first letter printed?	
iii) What is the whole message printed?	
iv) Detail the changes needed to the code to print the message in reverse:	

9. (a) What is the output:

```
#include <iostream>
using namespace std;
int main()
{
    for (int i = -5; i < 15; i += 5) {
        cout << i << endl;
     }
     return 0;
}</pre>
```



(b) Fill in the missing code to yield the output:

```
#include <iostream>
using namespace std;
int main()
{
    int n=12, m=-5;
    while(n+m ) {
        cout << n << " " << m << endl;
        n-=2;
        m++;
      }
    return 0;
}</pre>
```

Jutput:	
12 -5	
10 -4	
8 -3	
6 -2	
4 -1	
2 0	
0 1	

(c) What is the output:

```
#include <iostream>
using namespace std;
int main()
{
    int size = 5;
    for (int i = 1; i <= size; i += 2)
    {
        for (int j = 0; j < (size - i)/2; j++)
            cout << " ";
        for (int j = 0; j < i; j++)
            cout << " ";
        cout << endl;
    }
    return 0;
}</pre>
```



10. (a) Translate the Python into a **complete** C++ program:

```
C++ program:
```

Python program:

```
num = 0
while num <= 0:
    mess = int(input("Enter positive: "))
print("Your number:", num)</pre>
```

))			

(b) Write a C++ program that asks the user for the starting amount, and interest rate and prints out the yearly balance of a savings account, for 5 years.

A sample run:

```
Please enter the starting amount: 3000
Please enter the interest rate: 0.03
Year 1 3090.00
Year 2 3182.70
Year 3 3278.18
Year 4 3376.53
Year 5 3477.82
```

SCRATCH PAPER

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