Answer Key:

FINAL EXAM, VERSION 3 CSci 127: Introduction to Computer Science Hunter College, City University of New York

Spring 2025

```
1. (a) What will the following Python code print:
    num_s = "one,twenty,thirty three,four,twenty two"
    nums = num_s.split(",")
    print(nums[-1])
    count = num_s.count(" ")
    print("List has", count, "two-parts.")
    two_nums = [n for n in nums if " " in n]
    print(two_nums)
    ones = ["zero","one","two","three","four"]
    tens = ["","","twenty","thirty","forty"]
    for num in two_nums:
        places = num.split(" ")
        dec = ones.index(places[1])+\
            tens.index(places[0])*10
        print(num, "=", dec)
```

Answer Key:

```
List has 2 two-part numbers.
['thirty three', 'twenty two']
thirty three = 33
twenty two = 22
```

(b) Consider the following shell commands:

```
$ ls
p1_out.png p10_out.png images lect1.pdf
$ file images
images: directory
$ pwd
/tmp/final/ver3
```

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

i. \$ mv lect1.pdf l1.pdf
i. \$ ls
Answer Key:

```
images
                          l1.pdf
                                                 p1_out.png
                                                                    p2_out.png
   $ mv *.png images
ii.
   $ ls
   Answer Key:
   images
                  l1.pdf
   $ cd images
iii.
   $ pwd
   Answer Key:
   /tmp/final/ver3/images
   $ echo "Num is:"
iv.
   $ ls p* | wc -l
    Answer Key:
   Num is:
   2
```

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

	Decimal	Binary	Hexadecimal
	5	101	5
Answer Key:	12	1100	С
	33	100001	21
	253	11111101	FD

- (b) Fill in the missing code to make the image:
- (c) Consider the code:

Answer Key:

```
import pandas as pd
i csvFile = input("Enter CSV file name: ')
i) csvFile = [pds] read_csv(csvFile)
  recipe["Amount'] = 2*recipe["Amount"]
  print(recipe)
```

The answer should include:

- Mark line 2 with a "(i)".
- On line 2, should circle the single quote (') that does not match the starting double quote.
- Mark line 3 with a "(ii)".
- In line 3, circle the word pds.

i. Circle the code above and mark line with (i) that caused this error:

csvFile = input("Enter CSV file name: ')

SyntaxError: unterminated string literal (detected at line 2) Write the code that would fix the error:

Answer Key: csvFile = input("Enter CSV file name: ")

ii. Box the code above and mark line with (ii) that caused this error: line 3: recipe = pds.read_csv(csvFile)

NameError: name 'pds' is not defined. Did you mean: 'pd'? Write the code that would fix the error:

```
Answer Key:
recipe = pd.read_csv(csvFile)
```

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

```
in1 = True
 i. in2 = True
   out = in1 or in2
    Answer Key:
   out = True
   in1 = True
ii. in2 = False
   out = in2 or (not in2 and not in1)
   Answer Key:
   out = False
                                       out
      in1
iii.
   in1 = False
   Answer Key:
   out = False
```

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



- (c) Design a circuit that implements the logical expression:
 - ((in1 and in2) or (in2 and in3)) or not (in2 or in3)



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

i. ramble(tia,0)

(b) For the following code:

i. What are the formal parameters for v1():

Answer Key: vincent, munem

ii. What are the formal parameters for start():

Answer Key: None

iii. What value does start() return:

Answer Key: 20

5. Write a function most_frequent() that takes a list of 8-digit strings and returns the string that occurs most in the list. If there is a tie for most occurrences, return the first alphabetically. For example:

```
ids = ['12345678','11223344','12312323','12345678']
most_frequent(ids)
```

would return `12345678' since it occurs twice, while all other entries oc.

	Libraries:	No additional– just core Python	
Answer Key:	Input:	list of 8-digit strings	
	Output:	the ID that occurs most often	

Design Pattern:

Answer Key:

 \Box Accumulator \checkmark Max/Min \checkmark Finding Duplicates \Box Searching **Principal Mechanisms** (select all that apply):

Answer Key:

✓ Single Loop □ Nested Loop ✓ Conditional (if/else) □ Recursion
 □ Indexing/slicing ✓ Dictionary □ List Comprehension □ Regular Expressions
 Process (as a concise and precise LIST OF STEPS / pseudocode):
 (Assume libraries have already been imported.)

Answer Key:

- (a) Set up an empty dictionary, new_dict.
- (b) For each ID in the ID list:
- (c) Check if the ID is in the dictionary.
- (d) If it is, increment the count
- (e) If it isn't, add ID with value 1 to the dictionary.
- (f) Find the maximum value in the dictionary and return its key.
- 6. Fill in for the code below to create an interactive map, based on housing data. Your program should ask the user for the input and output file names. It should read in the CSV file and create a new column that sums up the number of studio, 1-bedroom, and 2+ bedroom apartments in a single new column, Total Units. A interactive HTML map, based on the DataFrame entries, is saved to the specified outfile.

Answer Key:

```
#Import pandas and plotly express libraries:
import plotly.express as px
import pandas as pd
#Ask user for file name:
file_name = input('Enter names, separated by spaces: ')
#Read in the file to a DataFrame:
df = pd.read_csv(file_name)
#Make a new column that sums up "Studio", "1Bed", "2+Bed" columns:
df["Total Units"] = df["Studio"] + df["1Bed"] + df["2+Bed"]
#Use df to make a scatter_map: columns: "latitude" and "longitude" for location,
# "Project Name" for hover_name, & "Total Units" for size:
fig = px.scatter_map(df,
                     lat="latitude",
                     lon="longitude",
                     hover_name="name",
                     size="Total Units")
#Ask user for output file name:
html_file = input('Enter output file name: ')
#Save the file to html:
fig.write_html(html_file)
```

7. Write a **complete Python program** that

- asks the user for the name of a png file and
- prints the number of pixels that are bright blue (the fraction of blue is above 0.75 and the fraction of green, and the fraction of red are below 0.25).

Answer Key:

```
print("Blue count is", countBlue)
```

8. (a) Consider the following MIPS program:

```
ADDI $s0, $zero, 4
ADD $s1, $s0, $s0
ADD $s2, $s1, $s1
SUB $s3, $s2, $s0
```

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

\$s1 register	\$s2 register	\$s3 register	
Answer Key: 8	Answer Key: 16	Answer Key: 12	

(b) Consider the MIPS code:

```
1 ADDI $sp, $sp, -4
2 ADDI $t0, $zero, 68
3 ADDI $s2, $zero, 71
4 SETUP: SB $t0, 0($sp)
5 ADDI $sp, $sp, 1
6 ADDI $t0, $t0, 1
7 BEQ $t0, $s2, DONE
8 J SETUP
9 DONE: ADDI $t0, $zero, 0
  SB $t0, 0($sp)
10
11 ADDI $sp, $sp, -3
  ADDI $v0, $zero, 4
12
13 ADDI $a0, $sp, 0
  syscall
14
```

Answer Key:

i) How many characters are printed?	3
ii) What is the first character printed?	D
iii) What is the whole message printed?	DEF
iv) Detail the changes needed to the code	Line 2: Start t0 at 70.
to print the message in reverse:	Line 3: Start s2 at 67.
	Line 6: Subtract 1 from t0.

9. (a) What is the output

```
//Derek Bok
#include <iostream>
using namespace std;
int main()
{
    cout << "If you think education";
    cout << endl << "is expens";
    cout << "ive,\nTry ignorance.\n";
    return 0;
}</pre>
```

Answer Key:

If you think education is expensive, Try ignorance.

(b) What is the output:

```
#include <iostream>
   using namespace std;
   int main()
   {
        cout << "Hi" << endl;</pre>
        int x = 2;
        while (x > 0) {
            cout <<":)\n";</pre>
            x--;
        }
        cout << "Bye"<< endl;</pre>
        return 0;
   }
    Answer Key:
   Hi
    :)
    :)
    Bye
(c) What is the output:
```

```
#include <iostream>
using namespace std;
int main(){
    for (int i=0; i<4; i++){</pre>
         for(int j=0; j<4; j++){</pre>
             if ( i % 2 == 0)
                  cout<<"0";
             else
                   cout<<"1";
          }
          cout << endl;</pre>
     }
      return 0;
}
Answer Key:
0000
1111
0000
1111
```

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

```
Answer Key:
                                           #include <iostream>
                                           using namespace std;
Python program:
                                           int main()
                                           {
num = 1
                                              int num = 1;
while (num < 100) or (num \% 2 == 0):
                                              while ((num < 100) || (num%2 == 0))
   num = int(input("Enter large odd #: "))
                                              {
print("Your number:", num)
                                                cout << "Enter large odd #:";</pre>
                                                cin >> num;
                                              }
                                              cout << "Your number: " << num;</pre>
                                              return 0;
                                           }
```

C++ program:

(b) Write a C++ program that will ask for the time in 24 hour format (e.g. 2034 is 8:34pm) and, prints out "Early" if it is before noon (e.g. 1000), "Late" if it after 7pm (e.g. 1900), and otherwise print "Just Right."

A sample run:

Enter time: 1345 Good Afternoon

Answer Key:

```
#include <iostream>
using namespace std;
int main()
{
  int time;
  cout << "Enter time: ";</pre>
  cin >> time;
  if (time < 1000) {
    cout << "Early \n";</pre>
  }
  else if (time > 1900){
    cout << "Late \n";</pre>
  }
  else {
    cout << "Just Right \n";</pre>
  }
  return 0;
}
```