Name (print): ____________________________________________

- **INTEGRITY:** By taking this exam, you pledge that this is your work and you have neither given nor received inappropriate help during the taking of this exam in compliance with the Honor Code of Emory University. Do NOT sign nor take this exam if you do not agree with the honor code.

- **INSTRUCTIONS:**
  - Keep your eyes on your own paper.
  - Do your best to prevent anyone else from seeing your work.
  - Do NOT communicate with anyone other than the professor/proctor for ANY reason in ANY language in ANY manner.
  - Do not use notes, books, calculators, etc during the exam.
  - Turn all mobile devices off and put them away now. You cannot have them on your desk.
  - Write neatly and clearly. What I cannot read, I will assume to be incorrect.
  - Academic misconduct will not be tolerated. You are to uphold the honor and integrity bestowed upon you by Emory University. Penalties for misconduct will be a zero on this exam, an F grade in the course, and/or other disciplinary action.

- **TIME:** This exam has 5 questions on 9 pages including the title page. Please check to make sure all pages are included. You will have 50 minutes to complete this exam.

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*I commit to uphold the ideals of honor and integrity by refusing to betray the trust bestowed upon me as a member of the Emory community. I have also read and understand the requirements outlined above.*

Signature: ____________________________________________

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<table>
<thead>
<tr>
<th>Page</th>
<th>2</th>
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<th>4</th>
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<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
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<tbody>
<tr>
<td>Points</td>
<td>8</td>
<td>8</td>
<td>16</td>
<td>12</td>
<td>14</td>
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</tbody>
</table>
1. **Multiple Choice.** Circle the best answer for each question.

   (a) (2 points) The maximum and minimum values for the red, green, and blue values which make up computerized images are:
   
   A. 100 and -100  
   B. 100 and 0  
   C. 255 and -255  
   D. 255 and 1  
   **E. 255 and 0**

   (b) (2 points) A *block* of code in python is:
   
   A. the order in which program statements are executed in a python program. 
   B. statements which allows us to loop/iterate through all elements of a set. 
   C. program statements/expressions enclosed in parentheses. 
   D. **one or more program statements that share the same level of indentation.** 
   E. statements which evaluate to *True* or *False*

   (c) (2 points) *Dead code* is code which:
   
   A. returns *True* or *False*.  
   B. is encapsulated in a function.  
   C. **will never be executed given the structure of the surrounding code.** 
   D. is inside an *else* program statement. 
   E. is executed via a *return* statement.

   (d) (2 points) Choose an appropriate line of code to be inserted into the code below in place of the comment line which will prevent an infinite loop.

   ```python
   n = 4
   while n > 0:
       print "The value of n is: ", n
       #line of code here |
   ```

   A. n = n-1  
   B. n = n+1  
   C. n+1  
   D. n-1  
   E. No change is necessary. There is no infinite loop.
(e) (2 points) Which of the following is not a reason to add comments to your code?
   A. Comments help the reader understand the programmer's logic and intentions.
   B. Comments make the code maintenance task easier.
   C. Comments alter the flow of program execution.
   D. Comments help explain tricky or complex algorithms that the code implements.

(f) (2 points) In python the = operator performs an __________ operation while the == operator performs a __________.
   A. equality check, assignment
   B. assignment, overloaded operation
   C. equality check, comparison
   D. equality check, boolean comparison
   E. assignment, comparison

(g) (2 points) Which of the following is not a high-level programming language as discussed in your textbook?
   A. Java
   B. PHP
   C. C++
   D. Aloe
   E. Python

(h) (2 points) Computer images are made up of __________, which store color information about a particular location of the image.
   A. pixmaps
   B. pixels
   C. screens
   D. dots
   E. grids
2. (16 points) **Expression Evaluation.** Fill out the following table. The first row has been completed for you.

<table>
<thead>
<tr>
<th>Expression</th>
<th>Result</th>
<th>Type of result</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Hello&quot; + &quot;World&quot; + &quot;!&quot;</td>
<td>&quot;HelloWorld!&quot;</td>
<td>string</td>
</tr>
<tr>
<td>6 + 4.3</td>
<td>10.3</td>
<td>float</td>
</tr>
<tr>
<td>False or ((5%2)==1)</td>
<td>True</td>
<td>boolean</td>
</tr>
<tr>
<td>7.5 == 7.5</td>
<td>True</td>
<td>boolean</td>
</tr>
<tr>
<td>&quot;7&quot; + str(28)</td>
<td>&quot;728&quot;</td>
<td>string</td>
</tr>
<tr>
<td>&quot;bibbitybobbityboo&quot;[8]</td>
<td>&quot;o&quot;</td>
<td>string</td>
</tr>
<tr>
<td>100 - 10</td>
<td>90</td>
<td>int</td>
</tr>
<tr>
<td>&quot;hi&quot; * 3</td>
<td>&quot;hihihi&quot;</td>
<td>string</td>
</tr>
<tr>
<td>(5.0-2)**2+2</td>
<td>11.0</td>
<td>float</td>
</tr>
</tbody>
</table>
3. **Short Answer. Briefly (3-4 sentences max), answer the question below.**

   (a) (4 points) In your own words, explain the error below.

   ```
   >>> x = "Hello CS155"
   >>> x[11]
   Traceback (most recent call last):
     File "<stdin>", line 1, in <module>
   IndexError: string index out of range
   ```

   **Solution:** Computer Scientists start counting at 0. So the first letter in the string is in the 0th position, the second letter is in the 1st position, and so on. Since the last character of the string ("5") is in the 10th position, there is nothing in the 11th position. So trying to access it with the expression `x[11]` generates an index out of range error.

   (b) (4 points) In python, strings are *immutable*. What does this mean?

   **Solution:** It means they are unchangeable. So we can’t change letters or characters in a string without creating an entirely new string. We can’t do something like:
   ```
   x = "hello"
   x[0] = "j"
   ```
   without encountering an error.

   (c) (4 points) One of the lines of code below will cause an error when the program is run. Circle the problematic line and explain the error.

   ```
   e = "2.718"
   pi = 3.14
   pie = str(pi) + e
   print e + 4.04
   print pi + 3.14
   print pie
   ```

   **Solution:** The fourth line (print `e + 4.04`) will cause an error. You cannot concatenate strings and numerical data types.
(d) (6 points) What is printed to the screen when the following function is run with an input parameter equal to 12 (i.e. leak(12))? 

```python
def leak(n):
    if (n > 0):
        if (n % 4 == 0):
            print "drip", n
        if (n % 3 == 0):
            print "drop", n
```

Solution: 
drip 12
drop 12
+1.5 each element

(e) (8 points) Define the below terms and give an example of each:
   i. semantic error

   **Solution:** +2 each part

   An error in logic or understanding. When syntactically correct code gives an unexpected result.

   Example: A student typing 4/3 and expected to get a result of 1.333... as an answer. The code will execute correctly, but generate an unexpected (to the programmer) result.

   ii. syntax error

   **Solution:** +2 each part

   An error which violates the structure of a python program or the rules about a structure.

   Example: forgetting a color after a function definition or if-statement is a syntax error.
4. **Code Writing**

(a) (10 points) Write a function called `bigNum`. This function should take a `int` as an input parameter and return a boolean value. It should return true if the function’s input is more than 1000. It should return false if the function’s input is less than or equal to 1000.

Some examples:
```python
>>> longWord(10)
False
>>> longWord(1000)
False
>>> longWord(10000)
True
```

**Solution:** There are many ways to write this function. Here is one.

```python
def bigNum(num):
    if num > 1000:
        return True
    else:
        return False
```

+2 function definition
+1 parameter
+3 tests conditions correctly
+2 returns true appropriately
+2 returns false appropriately
(b) (16 points) Write a function called `reverseBlastoff` which takes an integer as input. It should count up from 0 to blastoff rather than count down. Your function should print out the “count-up” followed by the word “Blastoff!”. For example:

```python
>>> reverseBlastoff(3)
0
1
2
Blastoff!
```

**Solution:** A solution using a while loop:

```python
def reverseBlastoff(secs):
    x = 0
    while x < secs:
        print x
        x = x+1
    print "Blastoff!"
```

Another possible solution, utilizing a for loop and the range function is:

```python
def reverseBlastoff(secs):
    for x in range(secs):
        print x
        print "Blastoff!"
```

+2 function definition
+1 parameter
+4 uses input parameter to determine number of times to execute
+3 uses for/while loop correctly
+1 prints each number correctly
+2 begins at 0, ends at parameter-1
+3 prints “Blastoff!” after count-up sequence
5. (16 points) **Code Tracing**
   Pretend you are the python interpreter. "Run" the program below and give the appropriate output.

```python
def exam2Function(x):
    print "Length x:", len(x)
    return x * 3

print "Start"
y = exam2Function("Hello")
print "The value of y is", y

if (5 > len(y)):
    print y + ", Atlanta!"
elif (10 > len(y)):
    print y + ", Georgia!"
elif (15 > len(y)):
    print y + ", USA!"
elif (20 > len(y)):
    print y + ", North America!"
else:
    print y + ", World!"

print "End"
```

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**Solution:**
+1: Start
+4: Length x: 5
+4: The value of y is HelloHelloHello
+4: HelloHelloHello, North America!
+1: End

+2: All statements in correct order
-2: Incorrect additional print statement