Spring 2017 CS 1110/1111 Exam 1

Bubble in your computing ID in the footer of this page. We use an optical scanner to read it, so fill in the bubbles darkly. If you have a shorter ID, leave some rows blank.

In case we have trouble with the scanner, please also legibly print

Your name: ________________________________________________________________

Your computing ID: ______________________

Please observe the following directions throughout the exam:

- Write legibly; we deduct points if we are unsure what you wrote.
- Indentation and punctuation do matter.
- Write on the lines, where possible.
- If you need to insert a line between two you’ve written, make it clear that that is what you are doing.
- We grade one page at a time. Do not spill answers onto another page.
- Don’t add features we didn’t request: only print if we ask you to print, etc.

The exam is being given in multiple locations simultaneously, so we cannot fairly answer student questions during the exam. If you find a question ambiguous or unclear, write that down on your exam and we’ll give it due consideration during grading.

Pledge

On my honor as a student, I have neither given nor received help or assistance on this exam.

Signed: ________________________________________________________________
Question 1 (14 points)

Fill in the following table. The first row is done for you. If the expression results in an error, write “ERROR” on that row.

<table>
<thead>
<tr>
<th>Expression</th>
<th>Value</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 + 4.0</td>
<td>7.0</td>
<td>float</td>
</tr>
<tr>
<td>3 / 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 // 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 % 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;1&quot; + &quot;3&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 + 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>int(&quot;2.5&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>str(1+2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Question 2 (7 points)

Circle either “OK” or “Error” on each row to identify if each code snippet would generate an error or not. Assume that x is a variable that is re-set to contain the value 11 before each row.

<table>
<thead>
<tr>
<th>Code</th>
<th>OK</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 = x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>x = 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n = input &quot;Your name: &quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;x = &quot; + x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>int(str(float(x)))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;4&quot; * 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;4&quot; ** 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Question 3 (12 points)

Each of the following two programs output three lines of text. Write that output in the blanks provided.

```python
def f():
    global word
    print(word)
    word = "happy"
    print(word)
    word = "gleeful"
    f()
    print(word)

def f(word):
    print(word)
    word = "happy"
    print(word)
    word = "gleeful"
    f(word)
    print(word)
```

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Question 4 (2 points)

What is the difference between `print` and `return`?

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Question 5 (12 points)

Assume we run the following Python program. In the comment next to each `print`, write what the code prints when the corresponding line is run.

```python
def baz(x):
    print('x =', x)  # prints x =
    x = x - 2
    print('x =', x)  # prints x =
    return x

x = 10
print('x = ', x)  # prints x =
x = x - 2
print('x = ', x)  # prints x =
y = baz(x)
print('x = ', x)  # prints x =
print('y = ', y)  # prints y =
```
Question 6 (10 points)

Write a function named `repeat` that takes a single positive integer argument; the function prints its argument a number of times equal to its argument’s value, all on one line, separated by spaces.

For example, `repeat(3)` should print `3 3 3`; `repeat(5)` should print `5 5 5 5 5` etc.

Question 7 (15 points)

If a piece of text is made up of random lower-case English letters and numerals, the total number of possible pieces of text `n` letters long is $36^n$.

Write a Python function named `options` that, given a single `str` parameter, returns the number of strings of that length that can be constructed from lower-case English letters and numerals. For example, `options('hi')` should return 1296 (which is $36^2$)
Question 8 (24 points)

Write a program that asks the user to type two integers. If either integer is evenly divisible by the other, print \((\text{number}) \text{ is divisible by} \ (\text{number})\); otherwise print \((\text{number}) \text{ and} \ (\text{number}) \text{ are not divisible by one another}\).

For example, one run might be

Enter an integer: 12
Enter another integer: 3
12 is divisible by 3

Another run might be

Enter an integer: 12
Enter another integer: 30
12 and 30 are not divisible by one another
Question 9 (4 points)

Consider the problem of ordering a list of numbers, from smallest to largest. Two algorithms are given below:

1. Search through the input list once from beginning to end. Examine each pair of adjacent elements. If these are out of order, swap them.

2. Create an empty output list. Find the smallest element in the input list. Remove that element from the input list and add it to the end of the output list. Repeat those two steps until the input list is empty.

Which of the algorithms above produce an ordered list (from smallest to largest)? Circle the appropriate letter.

A. Just algorithm (1)

B. Just algorithm (2)

C. Both algorithms

D. Neither algorithm