CS 8

Midterm
(Conceptual Portion)

Monday, June 22, 2015

Name: SOLUTION

1. The exam is 4 sheets of paper (counting this cover page).

2. No books, notes, computers, or other electronic devices may be used during this portion of the exam.

3. Remember that there is also a programming portion to the exam. **Be sure to leave time to work on the programs.** Once you turn in this exam, you may not return to it while working on the programming portion, nor can you return to it after you finish the programming portion.

4. The concepts portion of the exam and the programming portion will be equally weighted.

Multiple Choice, True/False, and Short Evaluation

(1 point each, unless stated otherwise)

1. Which of the following mark the beginning of a comment?

   a) `//`

   b) `/*`

   c) `/**`

   d) #

2. What are the results of the following expessions? (2 points)

   - `2 * 2 + 5 // 4` `5`
   - `7 % 2` `1`
   - `7 / 2` `3.5`
   - `"ant" + "bird"` `"antbird"`

3. What kind of data does the `input` function return?

   a) string

   b) int

   c) float

   d) it depends on the value the user entered

4. Which of the following ***does not*** evaluate to a Boolean value (i.e. `True` or `False` value)? (select all that apply) Assume that `x`, `y`, and `z` are all numeric variables. Assume that `filename` is a string variable.

   a) `x = 5`

   b) `3 + y < z`

   c) `5 in ['a', 'b', 'c']`

   d) `y + x - 13`

   e) `os.path.exists(filename)`

5. True or **False**: Logical operators (i.e. `and`, `or`, `not`) have a lower precedence than relational operators (e.g. <, >=, !=). In other words, logical operators are evaluated *before* relational operators.

6. From the snippet of code below, what is printed to the screen? Select all that are printed.

```
majority_pct = 73

if 66.67 <= majority_pct:
    print("Two-third majority")
elif 50 < majority_pct:
    print("Simple majority")
else:
    print("No majority")
```

   a) `Two-third majority`

   b) `Simple majority`

   c) `No majority`

   d) *None of the above*

7. True or **False**: A sentinel value is the starting value for an accumulator variable.

8. What does the following code snippet print out?

```
items = ['ant', 'bird', 'cat', 'dog']
print(items[-2])
```

a) `ant`

b) `bird`

c) `cat`

d) `dog`

e) *None of the above; there is an error in the code snippet*

9. Which of the following create a list containing 1, 3, and 5? (select all that apply) (2 points)
Assume `values` is the list:

```
values = [1, 2, 3, 4, 5, 6]
```

a) `[1 + 3 + 5]`

b) `[values.index(1), values.index(3), values.index(5)]`

c) `values[:5:2]`

d) `values[0] + values[2] + values[4]`

e) `[values[0]] + [values[2]] + [values[4]]`

f) `[values[i] for i in range(len(values), 2)]`

10. If your program is located at (and run at):

`CS8/midterm/src/load/program10.py`

and the data that program10.py wants to access is at:

`CS8/midterm/data/info.dat`

which of the following is the correct relative location for the data file:

a) `info.dat`

b) `../info.dat`

c) `../data/info.dat`

d) `../../data/info.dat`

e) `../data/../info.dat`

Short Answer:

For this section:

- If a program prompts the user for input, take on the role of the user and provide the input (underline the user's input).
- If the program throws an error/exception, indicate that (including the line on which the error occurs).
- In the output, make it clear whether or not there are spaces.
- Any illegible writing will be assumed to be incorrect.

1. Show all of the output of the program below. Any values the user enters should also be shown and underlined. (5 points)

```
name = input("Your name: ")

num = input("Favorite number: ")

print(name, "your favorite number is: num")

num1 = num + 1

print("num + 1 =", num1)
```

Output:
Your name: Michael
Favorite number: 3
Michael your favorite number is: num
T*he next line(num1 = num + 1) has a problem. You cannot combine a string (num) with an integer (1).*

2. Briefly explain why we should *not* use the equality operator when comparing floats. (1 point)

The equality operator compares two values to see if they are exactly equal. Floats are not always represented exactly in the computer (they're often rounded). Because of this rounding, two numbers that are mathematically equal may not be exactly equal according to the computer (because of rounding errors). For this reason, instead of exactly equality, you should compare floats by looking at whether the absolute value of the difference is below a threshold.

3. What is one case where a while loop is better than a for loop? (3 points)

- Validating user input
- Looping an unknown number of times.

4. There is one problem with this program. What is it? Identify where the problem is, why it is a problem, and how to fix it. (3 points)

```
print("The square of the numbers 1 through 5 (inclusive) are:")
n = 1
while n < 6:
    n2 = n*n
    print(n, " ^ 2", n2)
```

This is an infinite loop because n is never updated. So, n will always be 1 and so will always be less than 6. To fix this, put this at the end of the while loop:

n = n + 1

5. Show the output of the following code snippet: (3 points)

```
a = [1, 2, 3]
b = a[:]
b[0] = 'a'
print('a =', a)
print('b =', b)
```

```
a = [1, 2, 3]
b = ['a', 2, 3]
```

6. There is one problem with this program. What is it? Identify where the problem is, why it is a problem, and how to fix it. (3 points)

```
FILENAME = 'midterm6.txt'
outfile = open(FILENAME, 'w')
outfile.write('Question #6')


infile = open(FILENAME, 'r')
print(infile.read())
infile.close()
```

outfile is not closed before the file is opened for reading. Because of that, there's a chance that the contents written to the file will not actually be in the file yet when it is opened for reading. To fix this, after the outfile.write line, put: outfile.close()