MIDTERM STUDY GUIDE
TCSS 142 AUTUMN 2014

1. Expressions (estimated time 10 minutes)

Given the following sequence of statements, indicate in the right column the contents of each variable after the line executes. Assume that these are actual lines in the program that will execute one by one, i.e. the value of a variable is dependent on the changes to that variable made in the lines above. List a value of appropriate type and capitalization, e.g., `7` for an `int`, `7.0` for a `floating-point`, `"hello"` for a `string`, etc.

Also, below the code, indicate what will be printed to the screen.

We went over such problems a few times:
- Day 2, slide 16/17
- Lab 1, problem 3a

Statements

Variable memory values

```
a = 3

b = 5

c = 8 - a * 2 + (b - 1)

a += 2

a = a // 2;

b = 3 * b / 2;

d = "hello"

e = d + " midterm"

print(format(b, "6.3f")
```

a	b	c	d	e

Screen output:

b. Explain how strings are compared, illustrate with examples

c. Explain how floats should be compared, illustrate with examples

2. Booleans and truth tables (estimated time 10 minutes)

    a. Lab 2, problems 2, 3, and 4

3. If statements (estimated time 20 minutes)

    a. Day 5, slide 7

    b. Lab 2, problem 4b

    c. Lab 3, problem 2

    d. Lab 3, problem 4a

    e. You are thinking about going with your friends to a movie. Write a piece of code that accepts two values from a user: the cost of a ticket in dollars, and the number of stars the movie received out of 5. You should print console output about how interested you are in seeing the movie; print either `very interested`, `sort-of interested`, or `not interested`, based on the following criteria:

- You like bargains. Any movie that costs less than $5.00 is one that you want to see very much.
- You dislike expensive movies. You are not interested in seeing any movie that costs $12.00 or more, unless it got 5 stars (and even then, you are only sort-of interested).
- You like quality. You are very interested in seeing 5 star movies that cost under $12.00.
- You are sort-of interested in seeing movies costing between $5.00 - $11.99 that also got between 2-4 stars inclusive.
- You are not interested in seeing any other movies not described previously.

4. For loops (estimated time 20 minutes)

    a. Lab 3, problem 3, 4b

    b. Lab 4, problem 3

    c. Day 6, slide 9, 12

    d. Day 7, slide 3

    e. Write a piece of code that calculates the average of the first 10 terms of the geometric sequence:

{ 1, 2, 4, 8, 16, … } using a for loop, and then prints the resulting average.

f. Rewrite the code you wrote above so that it is it uses two variables read in from interactive input: N that determines the number of terms you should calculate the average of, and lowBound that is the beginning term in the geometric sequence described above. For example, if lowBound is 4 and N is 3, then the average of 4, 8, and 16 is calculated and returned.

5. While loops (estimated time 20 minutes)

a. Day 7, slide 12

b. Day 8, slide 4, 6, 8, 11, 16

c. Lab 4, problem 2, 4

d. For each of the following while loops, state how many times the loop will execute its body: zero, infinity, unknown are legal answers. Also, what is the output in each case?

```
x = 1
while x < 100:
        print(x)
        x += 10
------
y = 10
while y < 10:
        print("count down: ", y)
        y = y -1
------
z = 250
while z % 3 != 0:
        print(z)
```

e. A new radioactive element named Pythonian discovered by an unnamed TCSS 142 student decays (loses mass) at a rate of 1.2% each year. Write a program that asks the user for the original mass of the element and then prints to the screen the table showing how much of Pythonian is left after each year. Your table has to show the number of years it takes for the given mass to decay to 50% or less of its original mass (its half-life). Here is sample output:

```
Input original mass: 10
years   mass
1       9.88
2       9.76144
3       9.64430272
4       9.528571087360001
5       9.41422823431168
....
55      5.147921933104269
56      5.086146869907018
57      5.025113107468133
58      4.964811750178516
```

f. Write a program that repeatedly flips a coin until the results of the coin toss are three heads in a row. You should use randomint to make it equally likely that a head or a tail will appear. Each time the coin is flipped, display H for heads or T for tails. When 3 heads in a row are flipped, the program should print a congratulatory message. Here is possible output:

T T H T H H T T T T H H H
Three heads in a row!