

CS 2316 Exam 1 Practice

Name (print clearly): _____

Signature: _____

GT account username (gtg, gth, msmith3, etc): _____

- Signing signifies you are aware of and in accordance with the **Academic Honor Code of Georgia Tech**.
- Calculators and cell phones are NOT allowed.
- This is a Python programming test. Where asked for Python statements or expressions you must print them exactly as they would be typed in a Python source file or interactive shell.

Question	Points per Page	Points Lost	Points Earned	Graded By
Page 1	4	-	=	
Page 2	10	-	=	
Page 3	8	-	=	
Page 4	10	-	=	
Page 5	10	-	=	
Page 6	10	-	=	
Page 7	0	-	=	
Page 8	20	-	=	
TOTAL	72	-	=	

1. True or False

In each of the blanks below, write “T” if the statement beside the blank is true, “F” otherwise.

- [1] (a) ___ Every Python value has a type such as `float` or `int`.
- [1] (b) ___ Python variables are statically typed, meaning that once you assign a value to a variable you can only assign new values of the same type. For example, after `x = 3.14` you can only assign `float` values to `x`.
- [1] (c) ___ The `+` operator means the same for `str` values as it does for `int` values.
- [1] (d) ___ `try = try + 1 # increment the number of tries` is a valid Python statement.

2. Expression Evaluation

For each expression below, write the value and then the Python data type of the evaluated legal expression in the space provided. Be exact.

Expression: $7 / 2$

[1] (a) Calculated value: _____

[1] (b) Type: _____

Expression: $64 - 16 * 2$

[1] (c) Calculated value: _____

[1] (d) Type: _____

Expression: `'Ni' * 3`

[1] (e) Calculated value: _____

[1] (f) Type: _____

Expression: $1 // 2$

[1] (g) Calculated value: _____

[1] (h) Type: _____

Expression: `True and (1 == 2)`

[1] (i) Calculated value: _____

[1] (j) Type: _____

3. **Multiple Choice** Circle the letter of the correct choice.

[2] (a) Given the following code:

```
capitals = {}
capitals['Murica'] = 'Warshington'
capitals['Germany'] = 'Bonn'
capitals['France'] = 'Paris'
capitals['Engalnd'] = 'London'
capitals['Germany'] = 'Berlin'
```

What is `capitals['Germany']`?

- A. 'Berlin'
- B. 'Sweden'
- C. 'Paris'
- D. 'London'

[2] (b) What is `len(set(['A', 'b', 'b', 'a']))`

- A. 2
- B. 3
- C. 4
- D. 0

[2] (c) What is wrong with this code:

```
n = 5
while n > 0:
    print(n)
n -= 1
```

- A. The variable `n` is declared outside the scope of the `while` loop.
- B. The `while` loop never finishes.
- C. The variable `n` is the wrong type.
- D. There is nothing wrong with this code.

[2] (d) What's the value of the expression `''.join('h a n d s'.split())`

- A. 'hands'
- B. 'h a n d s'
- C. ['h', 'a', 'n', 'd', 's']
- D. None

4. Tracing

Consider the following program:

```
counter = 0;

def incrementCounter():
    global counter
    counter += 1
    return True

if __name__ == '__main__':
    a = True
    b = False;
    if b or incrementCounter():
        print("Boo")
    if (a or b) and incrementCounter():
        print("ya!")
    print(counter)
```

- [5] (a) What is printed when this program is run from the command line?

Consider the following program:

```
mystery = "mnerigpaba"
solved = ""
for i in range(len(mystery) // 2):
    j = -i - 1
    solved += mystery[i] + mystery[j]
print(solved)
```

- [5] (b) What is printed when this program is run from the command line?

5. **Short Answer**

- [2] (a) What is the value of "abcdefg"[:-1]
- [2] (b) Write a list comprehension that returns a list of the first 5 squares where the first square is 1.
- [2] (c) Write an expression that computes the average of a list of numbers `nums`.
- [2] (d) Make the dictionary variable, `e2f`, that contains mappings from English words to their French equivalents. Use these words: dog is chien, cat is chat, and walrus is morse.
- [2] (e) Write a dictionary comprehension that converts `e2f` to a dictionary from French words to their english equivalents and assigns this new dictionary to a variable `f2e`

6. Complete the Method

- [5] (a) Fill in the code for the following method that takes a list of numbers and returns the number of even numbers in list argument. Your code should use a `for` statement.

```
def evens(nums):
```

- [5] (b) Fill in the code for the following method that takes a list of numbers and a number and returns `True` if the list contains the number, `False` otherwise. You will need a loop, and your loop must not execute more iterations than necessary, and you cannot use `break` or `continue` or the `in` operator.

```
def contains(nums, n):  
    // Your code goes here
```

7. **Write the method.** Assume valid input.

[10] (a) Given a $m \times n$ matrix \mathbf{A} :

$$\mathbf{A} = \begin{bmatrix} A_{11} & A_{12} & \cdots & A_{1n} \\ A_{21} & A_{22} & \cdots & A_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ A_{m1} & A_{m2} & \cdots & A_{mn} \end{bmatrix}$$

The transpose \mathbf{A}^T is defined as: $[\mathbf{A}^T]_{ji} = [\mathbf{A}]_{ij}$. Think “the rows of a matrix are the columns of its transpose.” One way to represent matrices in Python is as a list of lists, for example:

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

Write a method `transpose` that takes a single parameter `m` representing a 2-dimensional matrix as a list of lists and returns its transpose as a list of lists. Hint: it's possible to do this in one line, but you may use `for` statements instead.

- [5] (a) Write a class `Person` with three instance variables: `name`, `age`, and `email` and two methods:
- `is_senior()`, which returns `True` if the `Person` instance's `age` is greater than 59, and
 - `user_name()`, which returns the user name portion of the instance's `email`, that is, the part before the `@` symbol.
- [5] (b) Write function, `oldest`, that takes a variable number of `Person` (from previous question) parameters (that is, a variable number of single `Person` objects) and returns the oldest `Person` among the arguments. Assume `oldest` is always called with at least one argument.