Name:

E-mail ID:

On my honor, I pledge that I have neither given nor received help on this test.

Signature:

Test rules

• Print your name, id, and pledge as requested.

• This pledged exam is closed textbook. The only device you may access during the test is your own laptop.

• You are not allowed to access class examples or your own past assignments during the test; i.e., the only Python code you may access or view are ones that you develop for this test.

• The only windows that can be open on your computer are PyCharm and a single browser with tabs only open to the class website.

• PyCharm can be used only for developing the Python files to be submitted. It cannot be used for the true-false and short answer questions.

• Code should compile and demonstrate proper programming style; e.g., header comments, whitespace, identifier naming, etc.

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1. (10 points) Consider the following code segment. In answering the below true and false questions.

```python
def f(x):
    y = 10 * x
    print(y)

a = 2
b = f(a)
print(’y =’, y)
```

a. True or false: x is called the parameter of f.

b. True or false: x is called the argument of f.

c. True or false: x is called the input of f.

d. True or false: f does not have a return value.

e. True or false: the return value of f is None.

f. True or false: f(a) is an invocation.

g. True or false: a is a local variable of f.

h. True or false: x is a local variable of f.

i. True or false: y is a local variable of f.

j. True or false: the statement print(’y =’, y) causes y = 20 to be printed.
2. (8 points) Suppose the following four function definitions are in effect

```python
def s(a):
a = 1112
a[0] = 1112
return a
def t(a):
a = 1112
return a
```

a. What is the output of the following code segment?
```python
x = 1
s(x)
print(x)
```

b. What is the output of the following code segment?
```python
a = 1
s(a)
print(a)
```

c. What is the output of the following code segment?
```python
x = 1
t(x)
print(x)
```

d. What is the output of the following code segment?
```python
a = 1
t(a)
print(a)
```

e. What is the output of the following code segment?
```python
x = 1
x = t(x)
print(x)
```

f. What is the output of the following code segment?
```python
x = [3, 1, 4, 1]
u(x)
print(x[0])
```

g. What is the output of the following code segment?
```python
x = [3, 1, 4, 1]
v(x)
print(x[0])
```

h. What is the output of the following code segment?
```python
x = [3, 1, 4, 1]
x = v(x)
print(x[0])
```
3. (3 points) What should the comment be for describing function $f()$?

```python
def f(x, y, z):
t1 = type(x)
t2 = type(y)
t3 = type(z)
return ((t1 == t2) and (t2 == t3))
```

4. (3 points) What should the comment be for describing function $f()$?

```python
def f(x):
n = len(x)
for i in range(0, n):
    if (x[i] < 0):
        x[i] = -x[i]
```

5. (3 points) What should the comment be for describing function $f()$?

```python
def f(x):
b1, b2, b3 = False, False, False
n = len(x)
for i in range(0, n):
    if (x[i] < 0):
        b1 = True
    elif (x[i] == 0):
        b2 = True
    else:
        b3 = True
b = b1 and b2 and b3
return b
```

6. (3 points) What should the comment be for describing function $f()$?

```python
def f(x):
b1, b2, b3 = False, False, False
n = len(x)
for i in range(0, n):
    b1 = b1 or (x[i] < 0)
    b2 = b2 or (x[i] == 0)
    b3 = b3 or (x[i] > 0)
b = b1 and b2 and b3
return b
```
Part II Module implementation

7. (10 points) Develop module a.py. The module defines a single function $f()$. The function has no parameters and does not have a return statement. The function prints your email id and nothing else. Also develop a program atest.py. The only action of the tester is to invoke function $f()$ exactly once. Suppose the email id of the code developer for a.py is mst3k. The output of the tester should be

```
  mst3k
```

8. (10 points) Develop module b.py. The module defines a single function $f()$. The function has four parameters $a$, $b$, $c$, and $v$ that are to be numeric values. The function does not print any output. The function returns the value of $a \times v^2 + b \times v + c$. A tester btest.py for function $f()$ is available. A run of the tester should produce output

```
  32.25
  45.125
  37.516000000000005
```

9. (10 points) Develop module c.py. The module defines a single function $f()$. The function has one parameter $x$ that is to be a list of strings. The function does not print any output. The function returns the length of the longest string in $x$. A tester ctest.py for function $f()$ is available. A run of the tester should produce output

```
  5
  6
  7
```

10. (10 points) Develop module d.py. The module defines a single function $f()$. The function has two parameters $b$ and $c$ that are to be numeric lists. The function does not print any output. The function returns the inner product of $b$ and $c$, where

- If $b$ and $c$ have different lengths, the inner product is None.
- If $b$ and $c$ have the same length, then the inner product is

\[
(b[0] \times c[0]) + (b[1] \times c[1]) + \ldots + (b[n-1] \times c[n-1])
\]

where $n$ is the length of the lists. A tester dtest.py for function $f()$ is available. A run of the tester should produce output

```
  38
  None
  55
```
11. (10 points) Develop module e.py. The module defines a single function \( f() \). The function has one parameter \( s \) whose value is a string containing zero or more numerical values. The function does not print any output. The function returns the numeric list corresponding to \( s \). For example, if \( x = '1.2 3.4 5.6' \) then \( f(x) \) returns \([1.2, 3.4, 5.6]\). A tester e\_test.py for function \( f() \) is available. A run of of the tester should produce output

\[
[3.0, 1.0, 4.0, 1.0] \\
[5.0, 9.0, 2.0] \\
[1.25, 2.5, 3.75, 4.0, 5.25]
\]

12. (10 points) Develop module f.py. The module defines a single function \( f() \). The function has two parameters \( x \) and \( y \) whose values are lists. The function does not print any output. The function returns as a list one copy of each value in \( x \) that is not in \( y \). For example, the following code segment

\[
x1 = [3, 1, 4, 1, 5, 9, 2, 6, 5, 3, 5, 8, 9]
y1 = [2, 7, 1, 8, 2, 8, 1, 8, 2, 8, 4, 5]
u1 = f.f(x1, y1)
\]

sets \( u1 \) to \([3, 9, 6]\). A tester f\_test.py for function \( f() \) is available. A run of of the tester should produce output

\[
[3, 9, 6] \\
['s', 'i', 'g'] \\
[]
\]

13. (10 points) Develop module g.py. The module defines a single function \( f() \). The function has one parameter \( m \) whose value is to be a dict. The function does not print any output. The function returns whether each key in \( m \) maps to a different value. For example, the following code segment

\[
abc = { 'A': 'apple', 'B': 'banana', 'C': 'cherry' }
roman = { 'i': 1, 'I': 1, 'v': 5, 'V': 5, 'x': 10, 'X': 10 }
b1 = g.f( abc )
b2 = g.f( roman )
\]

sets \( b1 \) to True because each key in \( abc \) maps to a unique value and set \( b2 \) to False as different keys in \( roman \) are mapped to the same value. A tester g\_test.py for function \( f() \) is available. A run of of the tester should produce output

\[
True \\
True \\
False
\]