CS 220 - Spring 2020

Instructors: Meena Syamkumar and Mike Doescher

Exam 1 — 15%

(Last) Surname: _____ (First) Given name: _____

NetID (email): _____ @wisc.edu

Fill in these fields (left to right) on the scantron form (use #2 pencil):

1. LAST NAME (surname) and FIRST NAME (given name), fill in bubbles
2. IDENTIFICATION NUMBER is your Campus ID number, fill in bubbles
3. Under *ABC* of SPECIAL CODES, write your lecture number, fill in bubbles:
   001 - MWF 11:00am (Meena)
   002 - MWF 1:20pm (Meena)
   003 - MWF 4:25pm (Mike)
4. Under *F* of SPECIAL CODES, write **6** and fill in bubble **6**

If you miss step 4 above (or do it wrong), the system may not grade you against the correct answer key, and your grade will be no better than if you were to randomly guess on each question. So don't forget!

Some of the problems in this exam are related to the course projects, but some questions assume the availability of slightly different functions (e.g., for accessing the data). We won't have any trick questions where we call a function that doesn't exist and you need to notice. Thus, if you see a call to a function we haven't explicitly defined in the problem, assume the function was properly implemented (perhaps immediately before the code snippet we DO show) and is available to you.

You may only reference your notesheet. You may not use books, your neighbors, calculators, or other electronic devices on this exam. Please place your student ID face up on your desk. Turn off and put away portable electronics now.

Use a #2 pencil to mark all answers. When you're done, please hand in these sheets in addition to your filled-in scantron.

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General Concepts

1. Consider variable x, which has been assigned the value 10 in the following code. Which of the follwoing will be of data-type float after this assignment?

```
x = 10
```

A. x B. x +5 **C. x/5** D. x == 10 E. x*3

2. Which of the following is a valid variable name?

A. `_2019_number_` B. `18_number` C. `address$30` D. `or` E. `"first_name"`

3. Which of the following evaluates to 33?

A. (2*3)*4**3 B. 3**4+1 C. 3+2**2+4 D. 3**4* 4 **E. (3+2**3)*3**

4. What will be printed by the following code snippet?

```
x = 3
w = "x"
y = w + "10"
print(type(y))
```

A. 13

B. 310

C. `<class 'int'>`

D. `<class 'str'>`

E. none of the above due to an error

5. What will be printed by the following sequence of commands entered into the terminal or PowerShell?

```
echo one > A.txt
echo two > B.txt
echo B.txt > A.txt
mv B.txt D.txt
cp D.txt A.txt
cat A.txt
```

   A. one

   B. two

   C. onetwo

   D. B.txt

   E. none of the above due to an error

6. What is printed by the following code?

```
i = 1
s = ""
while i < 6:
    i += 1
    if i % 2 == 0:
        s += str(i)
    else:
        continue
        s += ","
print(s)
```

   A. 2

   B. 24

   C. 246

   D. 2,4,6

   E. ,3,5,

General Concepts

7. What will be the value of z after the following code is executed?

```
x = 10
y = 5

def update(x, y=0):
    temp = x**2
    temp += y + 3**1 + x
    return (temp+5)

z = update(5,x)
```

A. 103 **B. 48** C. 43 D. 40 E. 55

8. What kind of error is present in the following code?

```
def fraction(numerator, denominator)
    return numerator / denominator
quotient = fraction(4,3)
print(quotient)
```

A. Syntax B. Runtime C. Semantic D. There is no error

9. What is correct to replace `????`, so that the for loop will print the same letters as the while loop?

```
i = 10
msg = "Python is Awesome"
while i < len(msg):
    print(msg[i])
    i += 1

????
    print(c)
```

A. `for c in msg[9:]:`
B. `for c in msg[10:]:`
C. `for c in msg.slice(10,len(msg)):`
D. `for c in msg[10:end]:`

10. What numbers are printed, and in what order?

```
val = 1
def func():
    val = 2
    print(val)
    return val
func()
print(val)
```

A. 1 B. 1, 1 C. 1, 2 **D. 2, 1** E. 2, 2

11. What is printed?

```
def h(x=1, y=2):
    print(x, y)

def g(x, y):
    h(y+1)

def f(x, y):
    g(y, y=x)

x = 10
y = 20
f(y, x)
```

A. 1 2 B. 10 20 C. 10 21 **D. 21 2** E. 20 11

12. What is printed?

```
a = not False and True or False
b = 6 * 2 ** 3 // 3
print(a , b)
```

A. True 12 **B. True 16** C. False 12 D. False 16 E. False 576

13. Which of the following kinds of statements may execute at most once in a function during a single invocation?

A. break B. continue **C. return** D. pass E. while

14. What is the output?

```
def exam(y1, y2):
    if y1 < y2:
        return y2+y1
    elif y1==y2:
        return y1**y2
    else:
        return y2 - y1

print(exam(5, 3))
```

A. 3 **B. -2** C. 8 D. 125 E. 2

15. What numbers are printed, and in what order?

```
i = 1
while i < 5:
    print(i)
    if i % 3 == 0:
        break
    i += 1
```

A. 1

B. 1,2

C. 1,2,3

D. 1,2,3,4

E. the loops never stops running and keeps printing numbers

16. Which of these will exactly print the text below (including exactly one space between words and the quotation marks):

```
The cat says "Meow"
```

A. `print("The cat says "Meow"")`

B. `print("The cat says", end="Meow\n")`

C. `print("The cat","Meow", sep="says")`

D. `print("The cat says \"Meow\"")`

E. Two or more of the above answers are correct

Tic-Tac-Toe

The following code attempts to draw a tic-tac-toe board.

```
  X| |
  -+-+-
   | |
  -+-+-
   | |
```

```
def draw(x=0, y=0, move="X"):
    i = 1
    while(i < 6):
        if i%2 == 0:
            print("-+-+-", end="")
        else:
            j = 0
            while j < 5:
                if j % 2 != 0:
                    print("|", end="")
                elif i == 2*x + 1 and j == 2*y:
                    print(move, end="")
                else:
                    print(" ", end="")
                j += 1
        print()
        i += 1

x = input("Enter x: ")
y = input("Enter y: ")
move = input("Enter move (X or O): ")
```

17. Assume the user provides `2, 1.0` and `X` as inputs to x, y, and move respectively. What will be the types of the values in global variables x, y, and move?

    A. int, int, float

    B. int, float, float

    C. str, str, str

    D. int, float, str

18. What would the following function call evaluate to?

```
draw(x=2, move="O")
```

A. `"O"` at the top-left corner of the board

B. `"O"` at the bottom-left corner of the board

C. `"O"` at the bottom-right corner of the board

D. `"O"` at the top-right corner of the board

E. `"O"` at the center of the board

19. Which of the following function calls would place an `"O"` at the bottom-right corner of the board?

A. `draw(0,0,"O")`

B. `draw(2,2)`

C. `draw(1,1,"O")`

D. `draw(2,2,"O")`

E. `draw(3,3,"O")`

20. What does the following function call evaluate to?

```
draw(-1, -1)
```

A. Empty Board

B. -1 at top-left corner

C. `"X"` at bottom-right corner

D. `"X"` at top left corner

Decisions

Reference the following code to answer the following questions.

```
def f(num1, num2, num3):
    if num1 > num2:
        if num1 > num3:
            return num1
        else:
            return num3
    elif num2 > num3:
        return num2
    else:
        return num3


def g(a,b):
    if a and b:
        return 0
    elif a or b:
        return 1
    else:
        return 0
```

21. What would `f(4,5,1)` evaluate to?

    A. 5

    B. 1

    C. True

    D. 4

    E. None

22. Which of the following mathematical expressions does function `f` implement?

    A. `num1 > num2`

    B. `max(num1, num2, num3)`

    C. `min(num1, num2, num3)`

    D. `num1 == num2 == num3`

23. Which of the following function calls evaluates to `1`?

A. `g(True, False)`

B. `g(True, True)`

C. `g(False, False)`

D. `g(false, true)`

E. `g(True)`

24. What does the following evaluate to?

```
g(f(1,2,3), f(0,-1,-5))
```

A. 0

B. 1

C. 2

D. 3

Glucose

Use the following code to answer the next several questions. This code attempts to predict the risk for diabetes.

```
def predict(glucose = 120, bmi = 50, age = 30):
    if glucose <= 127.5:
        if age <= 28.5:
            if bmi <= 45.4:
                return False
            elif bmi <= 55.3:
                return True
            else:
                return False
        else:
            return True
    else:
        if bmi <= 29.95:
            if glucose <= 145.5:
                return False
            else:
                return True
        elif bmi >= 40.3:
            return False
        else:
            pass
```

25. What will the following return? `predict(100, 50, 20)`

    A. True B. False C. None

26. What will the following return? `predict(glucose = 150)`

    A. True **B. False** C. None

27. How many default arguments will be used to initialize our parameters for this call? `predict(120, age = 30)`

    A. 0 **B. 1** C. 2 D. 3

28. If glucose is 130, and bmi is 45, we would like the function to return True. However, with these inputs predict() returns False. What is the technical term for this kind of error?

    A. runtime **B. semantic** C. segmentation D. syntax E. systematic

29. Here are six lines of code in the above program:

```
if bmi <= 45.4:
    return False
elif bmi <= 55.3:
    return True
else:
    return False
```

What is correct to replace `????`, so that the following four lines of code are equivalent with the original six lines of code?

```
if ????:
    return False
else:
    return True
```

A. `bmi > 55.3`

B. `45.4 < bmi <= 55.3`

C. `bmi <= 45.4 or bmi > 55.3`

D. `bmi <= 45.4 and bmi > 55.3`

30. Which of the following function calls have correct syntax?

A. answer = predict(glucose = 120, 50, 30)

B. answer = predict(glucose = 120)

C. answer = predict(50, 30, glucose = 120)

D. answer = predict(110, glucose = 120, 50, 30)

E. Two or more of the above have correct syntax

City

31. Assume `get_employee_count(agency)` returns the number of employees employed by the agency. For which agency does the following code print the current number of employees?

```
police = "library"
police = "fire"
streets = get_employee_count(police)
print(streets)
```

A. police B. parks **C. fire** D. streets E. library

32. What should be choosen as the return type of above function, `get_employee_count(agency)`?

A. str B. float **C. int** D. bool E. NoneType

33. Assume `get_spending(2018)` returns 2 and `get_spending(2019)` returns 3. What is printed?

```
def change(y1, y2):
    spend1 = get_spending(y1)
    spend2 = get_spending(y2)
    if y2 > y1:
        if spend2 > spend1:
            return 4
        else:
            return 3
    else:
        if spend2 > spend1:
            return 2
        else:
            return 1
print(change(2019, 2018))
```

A. 2 B. 3 **C. 1** D. 4 E. None

34. If we want to simplify the body of the `increase` function below, which among the following alternatives can provide the same logic as provided? Assume all parameters are initialized with integer values. Also, assume `get_spending` is a function which provides the spending for a given year.

```
def increase(yA, yB):
    spendA = get_spending(yA)
    spendB = get_spending(yB)
    x = False
    if yA < yB:
        if spendA < spendB:
         x = True
        else:
         x = False
    if yB < yA:
        if spendB < spendA:
            x = True
        else:
         x = False
    return x
```

A. `return spendA > spendB`

B. `return yA <= yB <= spendA <= spendB`

C. `return (yA < yB and spendA < spendB) or (yB < yA and spendB < spendA)`

D. `spendA < spendB and yA < yB`

E. None of the above implements equivalent logic

35. What minimum amount should agency `streets` spend in 2020 so that the average yearly spending from 2016 to 2020 increases by 20% from the average spending from 2016 to 2019? Assume that avg_spending(y1, y2) gives you the average yearly spending from y1 to y2.

A. 5*avg_spending(2016, 2019) - 4*avg_spending(2016,2019)

B. 1.2*avg_spending(2016, 2020) - 4*avg_spending(2016,2019)

C. 5*1.2*avg_spending(2016, 2019) - 4*avg_spending(2016,2019)

D. 5*1.2*avg_spending(2016, 2020) - 4*avg_spending(2016,2019)

E. None of the above