

<p>CS 220 - Spring 2022 Instructors: Meenakshi Syamkumar, Andrew Kuemmel, Cole Nelson</p> <p>Exam 1 — 10%</p>

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

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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 8:50am (Andy)
 - 004 - MWF 9:55am (Cole)
4. Under *F* of SPECIAL CODES, write **A** 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!

Many 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 (including smart watches) 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

1. Consider the following variables, values, and pseudocode.

Variable	Value
X	2
Y	2
Z	1
ans	0

1. If the value in X is 0, skip to step 6. Otherwise, continue to step 2.
2. Add the value in X to the value in Y and store the result in Y.
3. Add the value in Y to the value in Z and store the result in Z.
4. Subtract 1 from the value in X and store the result in X.
5. Go to step 1.
6. Store the absolute value of the difference between the value of Z and the value of Y in **ans**.

What is the final value of **ans** after executing the above pseudocode?

- A. -5 B. 5 C. 10 D. 15
2. Which of the following commands allows you to display the list of files and folders in a directory?
- A. `ls` B. `cat` C. `cd` D. `mkdir` E. `pwd`
3. What is the output of `print(9 // 2)`?
- A. 4.5 B. 4.0 C. 4 D. 5 E. 9 // 2
4. Which of the following would evaluate to 9.0?
- A. `3 ** 3 // 3`
B. `3 ** (3 // 3)`
C. `81 ** (1 / 2)`
D. `81 ** 1 / 2`
E. 9

5. Which of the following would evaluate to True?

- (i) `19 % 5 == 4 and 19 // 5 == 4`
- (ii) `not (1 < 0 or 1 == 0) and (True and not False)`
- (iii) `type(3 ** 3 // 3) != type(3 ** 3 / 3)`

- A. (i) and (ii)
- B. (i) and (iii)
- C. (i), (ii), and (iii)
- D. (ii) and (iii)**
- E. None of the above

6. What will be the value of the variable `x` after the following code is executed?

```
x = 6
x = x - 2
x += x
print(x)
```

- A. -2 B. 0 C. 2 D. 6 **E. 8**

7. What type of error will be encountered while executing the below code snippet?

```
x = int(input("Enter a positive integer for x: "))
y = int(input("Enter a positive integer for y: "))
print("x divided by y is: " + x / y)
```

- A. Syntax error **B. Runtime error** C. Semantic error D. No error

8. What will be printed out after the following code executes?

```
print("hello" * 3, "world", sep = "-", end = ";")
```

- A. hello-world;
- B. hello-hello-hello;world;
- C. hellohellohello-world;**
- D. hellohellohello-world-;

9. What will be printed out after the following code is executed?

```
def foo(x):  
    x = x * 2  
    return x  
    x = 0  
  
print(foo(2))
```

A. 0 B. 2 C. 4 D. 8

10. What will be printed out after the following code is executed?

```
x = 5  
  
def func1():  
    global x  
    x = 15  
  
def func2():  
    print(x)  
  
x = 10  
func1()  
x = 20  
func2()
```

A. 5 B. 10 C. 15 D. 20 E. Nothing (program crashes)

11. What will be printed out after the following code is executed?

```
def h(x = 3, y = 4):  
    print(x, y)  
  
def g(x, y):  
    h(x)  
  
def f(x, y):  
    g(x = x-1, y = x-2)  
  
x = 5  
y = 6  
  
f(y, x)
```

A. 3 4 B. 4 3 C. 4 4 D. 5 4 E. 5 6

12. Given the following code, which statement(s) will be printed and in what order?

```
num = 1.9
if num > 2:
    print("STATEMENT_1")
if num < 2:
    print("STATEMENT_2")
if num < 1.9:
    print("STATEMENT_3")
if num > 1.9:
    print("STATEMENT_4")
else:
    print("STATEMENT_5")
```

- A. STATEMENT_1, STATEMENT_2, and STATEMENT_5
- B. STATEMENT_2
- C. STATEMENT_2 and STATEMENT_5
- D. STATEMENT_3
- E. STATEMENT_3 and STATEMENT_4

13. What does test_function do?

```
def test_function(num_1, num_2, num_3):
    if num_1 < num_2:
        if num_1 < num_3:
            return num_1
        else:
            return num_3
    elif num_2 < num_3:
        return num_2
    else:
        return num_3
```

- A. Prints the largest number
- B. Prints the smallest number
- C. Returns the largest number
- D. Returns the smallest number**

14. What values are printed, and in what order?

```
i = 0
while i < 15:
    i = i + 1
    if i % 3 != 0:
        continue
    print(i)
```

- A. 0, 3, 6, 9, 12
- B. 0, 3, 6, 9, 12, 15
- C. 3, 6, 9, 12
- D. 3, 6, 9, 12, 15
- E. No Output

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

```
i = 0
while i < 15:
    i = i + 1
    if i % 3 != 0:
        break
    print(i)
```

- A. 0, 3, 6, 9, 12
- B. 0, 3, 6, 9, 12, 15
- C. 3, 6, 9, 12
- D. 3, 6, 9, 12, 15
- E. No Output

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16. What should `EXPR1`, `EXPR2`, and `EXPR3` be replaced with so that the loop prints 50, 100, 200? (in that order)

```
i = EXPR1
while EXPR2:
    print(i)
    i += EXPR3
```

- A. 50, `i <= 200`, `i`
- B. 50, `i < 200`, `i`
- C. 50, `i < 200`, 50
- D. 50, `i < 200`, 100
- E. 200, `i > 0`, -50

City Spending

17. Choose the Boolean expression that should replace `???`. Assume data is only available for the years 2015 - 2021, inclusive.

```
def change_rate(start, end):
    # assume that start (year) and end (year) are in range
    if ???:
        print ("Invalid input for year(s)!")
        return "None"
    else:
        # code to compute change rate for valid arguments
```

- A. `start >= 2015 or start <= 2021 or end >= 2015 or end <= 2021`
- B. `start > 2015 and start < 2021 and end > 2015 and end < 2021`
- C. `start < 2015 or start > 2021 or end < 2015 or end > 2021`
- D. `start < 2015 and start > 2021 and end < 2015 and end > 2021`
- E. `start <= 2015 or start >= 2021 and end <= 2015 or end >= 2021`

-
18. Assume `get_spending(2016)` returns 6 and `get_spending(2019)` returns 6. What is printed?

```
def change(y1, y2):
    spend1 = get_spending(y1)
    spend2 = get_spending(y2)
    if y2 > y1:
        if spend2 > spend1:
            return "D"
        else:
            return "C"
    else:
        if spend2 > spend1:
            return "B"
        else:
            return "A"
print(change(2019, 2016))
```

A. A B. B C. C D. D

19. Which of the following is the value for `budget` after running the following code snippet? Assume that `y19` and `y20` are initialized to integers 1000 and 200.

```
budget = 0
y19 = get_spending(2019) # returns 1000
y20 = get_spending(2020) # returns 200

if y19 >= 1000:
    budget += 20
else:
    budget += 10

if y20 >= 1000:
    budget += 3
elif y20 >= 500:
    budget += 2
else:
    budget += 1
```

A. 15 B. 20 C. 21 D. 33 E. 36

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20. Assume `get_budget(agency)` returns the current budget of the given agency. If the following code is supposed to print the budget of the police agency, what must `???` be?

```
government = "police"
school = get_budget("government")
store = get_budget(government)
gym = government
police = school
print(???)
```

A. police B. school C. gym D. government E. store

21. What is the output?

```
def func(y1, y2, y3):
    if y1 > y2:
        if y1 > y3:
            return y1 - y2
        else:
            return y2 - y3

print(func(2020, 2018, 2022))
```

A. -4 B. -2 C. 2 D. 4 E. None

22. What is the type of `x`?

```
fiscal_year = 2022
x = fiscal_year // 3
```

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

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

A. for B. 2022_budget C. _2022_budget D. "_2022_budget" E. budget'22

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please turn over for next section questions**

Pokémon

Consider the following table and function to answer the next several questions. The function evaluates whether which Pokémon wins based on a variety of criteria.

Name	Region	Type	Attack
Chansey	Kanto	Normal	5
Voltorb	Kanto	Electric	30
Haunter	Kanto	Ghost	50
Snubbull	Johto	Fairy	80
Granbull	Johto	Fairy	120

Assume that `region(pkmn)`, `pkmn_type(pkmn)`, `attack(pkmn)` correspondingly return region, type, and attack of the Pokémon.

```
def who_wins(pkmn1 = "Granbull", pkmn2 = "Chansey"):
    region1 = region(pkmn1)
    region2 = region(pkmn2)
    pkmn1_attack = attack(pkmn1)
    pkmn2_attack = attack(pkmn2)

    if region1 == region2:
        if pkmn_type(pkmn1) == pkmn_type(pkmn2):
            return "Draw"
        else:
            if abs(pkmn1_attack - pkmn2_attack) >= 40:
                return "Run away"
            elif pkmn1_attack - pkmn2_attack > 0:
                return pkmn1
            else:
                return pkmn2
    else:
        return "Run away"
```

24. What is the return value of `who_wins("Voltorb", "Haunter")`?
A. Voltorb **B. Haunter** C. Draw D. Run away E. Syntax error
25. What is the return value of `who_wins("Haunter")`?
A. Chansey B. Haunter C. Draw **D. Run away** E. Syntax error
26. What is the return value of `who_wins(pkmn2 = "Snubbull")`?
A. Granbull B. Snubbull **C. Draw** D. Run away E. Syntax error

27. What is the return value of `who_wins()`?

- A. Granbull B. Chansey C. Draw **D. Run away** E. Syntax error

Consider the below function definition for the next two questions.

```
def characterize(attack, defense, spl_attack = 20, spl_defense = 70):
    if attack <= 50:
        if defense > 60:
            if spl_defense != 70:
                return True
            elif spl_attack == 20:
                return True

    return False
```

28. How many parameters have default arguments in `characterize` function?

- A. 1 **B. 2** C. 3 D. 4

29. Which of the following lines of code can be used to shorten the `characterize` function definition?

- A. `return (attack <= 50 and ((defense > 60 and spl_defense != 70) or spl_attack != 20))`
- B. `return (attack <= 50 and ((defense > 60 and spl_defense == 70) or not spl_attack != 20))`
- C. `return (attack <= 50 and ((defense > 60 or spl_defense != 70) or not spl_attack == 20))`
- D. `return (attack <= 50 and ((defense > 60 and spl_defense != 70) or not spl_attack != 20))`**

Battleship

Reference the following code for the next few questions. The code attempts to draw a battleship board. Here is a sample grid:

```
.....
.....
.....
...X.
.....

def draw(x, y, rows = 5, cols = 5): # Line 1
    i = 1                            # Line 2
    while i <= rows:                 # Line 3
        j = 1                        # Line 4
        while j <= cols:             # Line 5
            if y != i or x != j:     # Line 6
                print(".", end="")   # Line 7
            else:                     # Line 8
                print("X", end="")   # Line 9
            j += 1                    # Line 10
        print()                      # Line 11
    i += 1                            # Line 12
```

30. What are the dimensions (rows x columns) of the displayed grid after executing the function call `draw(1, 3, 7)`?
- A. 3 x 1 B. 1 x 3 C. 5 x 5 **D. 7 x 5** E. 5 x 7
31. Which function call would print an X in the top-right corner?
- A. `draw(0, 4)` B. `draw(4, 0)` C. `draw(5, 1)` D. `draw(1, 5)`
32. Suppose we change `or` in line 6 to `and`. How many X's will be drawn after invoking `draw(4, 1, rows = 3, cols = 4)`? **Note:** This change is **only for this question**.
- A. 1 **B. 6** C. 8 D. 12
33. Which of the following function calls would result in an **error**?
- A. `draw(x = 0, y = 1, 2, 3)`
B. `draw(-6, 8)`
C. `draw(1.0, 2.0)`
D. `draw(0 * 0, 10 // 10, 2, 3)`
E. None of the above

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34. We need to add functionality to this program that accepts user input for the values of `x` and `y`. Which one of the following function calls will correctly draw an X at the user entered input location?

```
x = input("Enter x: ")
y = input("Enter y: ")
# missing code
```

- A. `draw(x, y)`
 - B. `draw("x", "y")`
 - C. `draw(int(x), int(y))`
 - D. `draw(str(x), str(y))`
35. Which function call would print the below grid?

```
.....
.....
...X..
.....
.....
```

- A. `draw(3, 4)`
- B. `draw(4, 3)`
- C. `draw(3, 4, rows = 5, cols = 6)`
- D. `draw(4, 3, rows = 6, cols = 5)`
- E. `draw(4, 3, rows = 5, cols = 6)`

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