CS 220 - Fall 2022

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Exam 1 — 10%

(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 (Gurmail)
   004 - MWF 9:55am (Mike)
   005 - MWF 3:30pm (Mike)
   006 - MWF 1:20pm (Gurmail)
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!

You may only reference your note sheet. You may not use books, your neighbors, calculators, or other electronic devices during 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 the exam and note sheet and your filled-in scantron form. The note sheet will not be returned.

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General

1. Consider the following variables and their values.

   `x = 1, y = 6`

   Evaluate the pseudocode:

   ```
   1. If x is greater or equal to y, skip to step 5.
   2. Add the value of x to x, and store the result in x.
   3. Add 1 to y and store the result in y.
   4. Go back to step 1.
   5. Subtract 1 from x and store the value in x.
   ```

   What is the final value of x after executing the above code?

   A. -15 B. 1 C. 7 **D. 15** E. 31

2. Which of the following expressions evaluate to a value of type `int`?

   A. `2/2`
   B. `"10 / 2"`
   C. `6.0 * 3.0`
   D. `4 // 2`
   E. `7.0 + 5`

3. What will the following expression evaluate to?

   ```
   16 // 3 == 5 and 1 ** 1 == 1 * 1 and not 25 % 8 == 3
   ```

   A. `True`
   B. `False`
   C. `NaN`
   D. `None`
   E. `SyntaxError`

4. Which of the following variable names is valid?

   A. `123` B. `my-var` **C.** `_Var_` D. `Var!` E. `1_var`

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

```
def func(x):
    x = x / 2
    y = x - 1
    z = y ** 2
    return (z / y)

number = 2
func(number)
```

   A. Runtime

   B. Semantic

   C. Syntax

   D. No Error

6. What is FALSE about local variables?

   A. Local variables are located in the function call frame

   B. Local variables in a function die once the function returns

   C. Local variables can be used across different functions

   D. Local variables start fresh when functions are called

7. What is printed by the following code?

```
x = 10
y = 5
z = 7

def a(x=1, y=0, z=5):
    x = z + 1
    b(x, y)

def b(r, s):
    c(y=s, x=r)

def c(x, y, z=10):
    print(x, y, z)

a(y, z)
```

A. 6 7 10

B. 7 6 10

C. 8 5 10

D. 6 7 7

E. 10 5 7

8. What is the value of x after the following code executes?

```
x = 8

def add_by_1(x):
    return x + 1

def multiply_by_2(x):
    return 2 * x

add_by_1(x)
x = multiply_by_2(x)
```

A. 8 B. 9 **C. 16** D. 18

9. Which of the following letters will be printed?

```
x = 3

if x < 3:
    print("A")
if x >= 3:
    print("B")
elif x == 3:
    print("C")
if x > 3:
    print("D")
else:
    print("E")
```

A. A, C, E

B. A, D

C. B, C

D. B, C, E

E. B, E

10. What should you assign to `a1` and `a2`, so that "success" is printed?

```
a1 = ???
a2 = ???

if not a1 and not a2:
    print("fail")
elif (a1 and not a2) or (a1 and a2):
    print("fail")
else:
    print("success")
```

A. `a1 = True, a2 = True`

B. `a1 = True, a2 = False`

C. `a1 = False, a2 = True`

D. `a1 = False, a2 = False`

11. If you want to stop the current iteration of a loop and move on to the next iteration, you should use:

A. `break` **B.** `continue` C. `next` D. `pass` E. `return`

12. What values are printed?

```
i = 0
while i <= 10:
    if i % 2 == 0:
        i = i + 1
        print(i)
    else:
        continue
    i += 1
```

A. `0, 2, 4, 6, 8`

B. `0, 2, 4, 6, 8, 10`

C. `1, 3, 5, 7, 9`

D. `1, 3, 5, 7, 9, 11`

E. The program will result in an infinite loop.

13. We want to change the following `while` loop to a `for` loop. What should replace the ???, so that the `for` loop version is equivalent to the `while` loop version?

```
#while loop version
i = 0
while i <= 10:
    print("Hi")
    i += 1

#for loop version
???
    print("Hi")
```

A. `for 10:`

B. `for i in 11:`

C. `for i in range(10):`

D. `for i in range(len(10)):`

E. `for i in range(11):`

Electric Vehicle Sales

14. The following function, `sales_per_year(year)`, calculates the sales of electric cars per year. Choose the Boolean expression that should replace ???. Assume that the data is available only for the years 2015 to 2019 (inclusive).

```
def sales_per_year(year):
    if ???:
        print("Invalid input for year")
        return None
    else:
        # Perform sales of cars per year calculation
```

A. `year >= 2015 and year <= 2019`

B. `year < 2015 and year > 2019`

C. `year <= 2015 or year >= 2019`

D. `year >= 2015 or year <= 2019`

E. `year < 2015 or year > 2019`

15. If we want to simplify the following function, `sales_increased(yearA, soldA, yearB, soldB)`, which expression has the same logic? Assume all parameters are initialized to integer values.

```
def sales_increased(yearA, soldA, yearB, soldB):
    if yearA < yearB:
        if soldA < soldB:
            return True
    if yearA > yearB:
        if soldA > soldB:
            return True
    return False
```

A. `(yearA < yearB or soldA < soldB) or (yearA > yearB or soldA > soldB)`

B. `(yearA < yearB and soldA < soldB) or (yearA > yearB and soldA > soldB)`

C. `(yearA < yearB and soldA < soldB) and (yearA > yearB and soldA > soldB)`

D. `(yearA < yearB or soldA < soldB) and (yearA > yearB or soldA > soldB)`

E. `soldA < soldB`

16. What value will be printed after running the following code snippet? Assume that `s1 = project.get_sales(project.get_id("Tesla Model X"), 2021)` returns `19425` and `s2 = project.get_sales(project.get_id("Tesla Model X"), 2022)` returns `26100`.

```
def change(model, y1, y2):
    s1 = project.get_sales(project.get_id(model), y1)
    s2 = project.get_sales(project.get_id(model), y2)

    if y1 < y2:
        if s1 < s2:
            return "A"
        else:
            return "B"
    else:
        if s2 > s1:
            return "C"
        else:
            return "D"
    return "E"

print(change("Tesla Model X", 2021, 2022))
```

A. `A`   B. `B`   C. `C`   D. `D`   E. `E`

17. Assume `sales_min(model_name)` returns the lowest number of sales in a year for the given model name across all years. Assume all model names are passed as strings separated by underscore while passing it to the function (e.g., `"nissan_leaf"`). If the following code is supposed to print the lowest sales for the Nissan Leaf, what must ??? be?

```
model_nissan = "nissan_leaf"
car_model = model_nissan
model_sales = sales_min(model_nissan)
nissan_sales = sales_min("model_nissan")
car_sales = nissan_sales
print(???)
```

A. `model_nissan`

B. `car_model`

C. `car_sales`

D. `nissan_sales`

E. `model_sales`

18. What is the output?

```
def func(a, b, c):
    if a < b:
        if c > a:
            return a - b
        elif b > c:
            return c - a
    else:
        return b - c

print(func(2019,2021,2018))
```

A. `-1` B. `-2` C. `0` D. `3` E. `None`

19. What is the type of `x`?

```
average_sales_chevy_volt = "15373.2"
x = len(average_sales_chevy_volt)
```

A. `float` **B.** `int` C. `str` D. `NoneType`

20. What value will be printed after running the following code snippet?

```
def foo(x, y):
    bar = 0
    if x < y:
        bar += 1
    else:
        if x <= y:
            bar += 1
    if not (x > y):
        bar += 1
    if x != y:
        bar += 1
    elif x > y:
        bar += 1
    return bar

print(foo(0,100))
```

A. `1` B. `2` **C.** `3` D. `4` E. `5`

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Dungeon Explorer

We are dungeon explorers that use robots to retrieve treasures guarded by monsters. Each of our robots have different names, fuel capacity, and movement speeds. The robots are equipped with sensors that can detect treasure and monsters. All of the robots are programmed to take a given action based on what they have detected.

Consider the following table and function to answer the next several questions. The function `robot_action` evaluates what action the robot will take based on a variety of criteria.

Robot	Fuel Capacity	Speed
Achilles	40	35
Joan	30	20
Marco	55	30

Assume that `get_speed(robot)` and `get_fuel(robot)` correspondingly return the speed and fuel capacity of a robot.

```
def robot_action(robot="Achilles", monster=False, treasure=True):
    if monster == True and treasure == False:
        if get_speed(robot) >= 30:
            return "Continuing on mission"
        else:
            return "Monster got me!"
    elif monster == False and treasure == True:
        if get_fuel(robot) >= 40:
            return "Acquired treasure"
        else:
            return "Fuel over"
    elif monster == True and treasure == True:
        if get_fuel(robot) >= 45 and get_speed(robot) >= 30:
            return "Acquired treasure"
        else:
            return "Monster got me!"
    else:
        return "Continuing on mission"
```

21. What is the output of `robot_action()`?

    A. “Acquired treasure”

    B. “Continuing on mission”

    C. “Fuel over”

    D. “Monster got me!”

    E. SyntaxError

22. What is the output of `robot_action("Joan", True)`?

   A. “Acquired treasure”

   B. “Continuing on mission”

   C. “Fuel over”

   D. “Monster got me!”

   E. SyntaxError

23. What is the output of `robot_action(robot="Marco", True)`?

   A. “Acquired treasure”

   B. “Continuing on mission”

   C. “Fuel over”

   D. “Monster got me!”

   E. SyntaxError

Consider the below function definition for the next two questions.

```
def mission(robot, fuel, speed, time):
    if speed >= 40:
        if time > 60:
            if fuel != 30:
                return True
        elif robot == "Joan":
            return True
    return False
```

24. How many arguments must be passed to the `mission` function for it to function correctly??

A. 0 B. 1 C. 2 D. 3 **E. 4**

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

   A. `return (speed >= 40 and ((time > 60 and fuel == 30) or robot == "Joan"))`

   B. `return (speed >= 40 and ((time > 60 and fuel != 30) or robot == "Joan"))`

   C. `return (speed >= 40 or ((time > 60 and fuel == 30) and robot != "Joan"))`

   D. `return (speed >= 40 and ((time > 60 or fuel != 30) and robot != "Joan"))`

Tic-Tac-Toe

The function below attempts to print a tic-tac-toe board. All questions in this section refer to this original function.

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

```
def draw(x=0, y=0, move="X"):                 # Line 01
    x = x % 3                                  # Line 02
    y = y % 3                                  # Line 03
    i = 0                                      # Line 04
    while i < 5:                               # Line 05
        if i % 2 != 0:                         # Line 06
            print("-+-+-", end = "")           # Line 07
        else:                                  # Line 08
            j = 0                              # Line 09
            while j < 5:                       # Line 10
                if i == 2 * x and j == 2 * y:  # Line 11
                    print(move, end = "")      # Line 12
                elif j % 2 != 0:               # Line 13
                    print("|", end = "")       # Line 14
                else:                          # Line 15
                    print(" ", end = "")       # Line 16
                j += 1                         # Line 17
        print()                                # Line 18
        i += 1                                 # Line 19
```

26. What does `draw(8, 8)` print?

    A. An empty board

    B. A board with “X” in the top-left corner

    C. A board with “X” in the middle

    D. A board with “X” in the bottom-right corner

27. If we change the **and** in Line 11 to an **or**, how many X’s will be printed on the board when we run `draw(0, 0)`?

    A. 0 B. 1 C. 5 **D. 7**

28. How many times is the condition in Line 10 evaluated (`while j < 5:`) when we call `draw()`?

A. 5 B. 6 C. 15 **D. 18** E. 25

29. Which of the following lines would cause an infinite loop if commented out?

A. Line 2 B. Line 4 **C. Line 17** D. Line 18

30. What does `draw("0", "0", "#")` evaluate to?

A. A board with '#' in the top-left corner

B. A board with '#' in the bottom-left corner

C. An infinite loop

D. TypeError

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