(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 08:50 AM (Mike)
   002 - MWF 11:00 AM (Mike)
   003 - MWF 09:55 AM (Louis)
   004 - MWF 01:20 PM (Louis)
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 cannot 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, note sheet, and filled-in scantron form. The note sheet will not be returned.

General

1. What will be the output of the following code snippet?

```
names = ["Matthew", "Alicia"]
names.append("Bob")
names.sort()
names.pop()
print(names)
```

      A. ["Matthew", "Bob", "Alicia"]

      B. ["Matthew", "Bob"]

      C. ["Alicia", "Bob"]

      D. ["Alicia", "Bob", "Matthew"]

      E. None of the above

2. What text will be present in the file after this code runs?

```
f = open("file.txt", "w")
f.write("Hello")
f.close()

f = open("file.txt", "a")
f.write("World")
f.close()

f = open("file.txt", "r")
data = f.read()
data = "CS220"
f.close()
```

      A. CS220

      B. Hello

      C. World

      D. HelloWorld

      E. HelloWorldCS220

3. What will be the output of the following code snippet?

```
flights = [["UA 336", "Chicago", 500], ["NH 836", "Tokyo", 800],
                                    ["SQ 32", "Singapore", 1000]]
print(flights[1][1])
print(flights[1:])
```

     A. "UA 336" and [["UA 336", "Chicago", 500], ["NH 836", "Tokyo", 800]]

     B. "Tokyo" and [["NH 836", "Tokyo", 800], ["SQ 32", "Singapore", 1000]]

     C. "NH 836" and [["NH 836", "Tokyo", 800], ["SQ 32", "Singapore", 1000]]

     D. "Tokyo" and [["UA 336", "Chicago", 500], ["NH 836", "Tokyo", 800]]

4. Which of the following will access Jessica's physics grade?

```
student = {}
student["name"] = {1: "Jessica"}
student["grades"] = {"math": 85, "physics": 90, "biology": 95}
```

     A. grades["physics"]

     B. grades["Jessica"]["physics"]

     C. student["Jessica"]["physics"]

     D. student["grades"]["physics"]

5. What is the output of the following code?

```
names = {"Bob": 23, "John": 21, "Stephanie": 19}
names["Veronica"] = 20
print(names[1])
```

     A. KeyError

     B. 21

     C. John

     D. 23

6. Why is the following JSON file formatted incorrectly?

```
{
  "Ronaldinho": {
    "Stats": [95, 90, 92],
    "Team": 'Barcelona',
    "Year": 2008,
    "Country": null
  }
}
```

      A. `null used instead of None`

      B. `List items must be strings`

      C. `Dictionary keys must be integers`

      D. `Strings must be enclosed within double quotations`

7. How would you access the manufacturer of the A7C II Camera?

```
Camera = namedtuple("Camera", ["model", "manufacturer", "year", "price"])
cameras = [
    Camera("A7C II", "Sony", 2023, 2198),
    Camera("XH2-S", "Fujifilm", 2023, 2499),
    Camera("EOS R3", "Canon", 2021, 4799)
]
```

      A. `cameras.manufacturer[0]`

      B. `cameras[0].manufacturer`

      C. `cameras[manufacturer][0]`

      D. `cameras[0]["manufacturer"]`

8. What is the output of the following code?

```
import copy
orig = [5, [6,7]]
x = orig
y = copy.copy(x)
y[0] = 1
y[1][0] = 2
y[1][1] = 3
print(x)
```

    A. [5, [6, 7]]

    B. [1, [2, 3]]

    C. [5, [2, 3]]

    D. [1, [6, 7]]

9. What is the output of the following code?

```
def foo(n):
    if n>4:
        return n + foo(n-1)
    return 0
print(foo(6))
```

    A. 6

    B. 11

    C. 15

    D. 18

10. How could you sort the names based on the length of the first name in order of increasing length?

```python
names = [
    ("Theodore", "Anderson"),
    ("Evelyn", "Smith"),
    ("Mia", "Miller"),
]

def extract(name_tuple):
    return len(name_tuple[0])
```

    A. `names.sort(reverse:True)`

    B. `names.sort(key=extract)`

    C. `extract(names)`

    D. `names.sort()`

    E. `names.sort(key=extract())`

11. Which of the following would generate a case-insensitive list of words containing "s"?

```python
proteins = ["Peanut", "Eggs", "Salmon", "Steak", "Chicken", "Greek Yogurt"]
answer = ["Eggs", "Salmon", "Steak"]
```

    A. `[for protein in proteins:  if "s" in protein.lower():  protein]`

    B. `[protein if "s" in protein.lower() for protein in proteins]`

    C. `[protein for protein in proteins if "s" in protein]`

    D. `[protein for protein in proteins if "s" in protein.lower()]`

    E. `[protein.lower() for protein in proteins if "s" in protein]`

12. What does the following code print?

```python
prev = [10, 20, 30]
new = []
for i in range(5):
    try:
        new.append(prev[i])
    except:
        new.append(-1)
print(new)
```

    A. [10, 20, 30]

    B. [10, 20, 30, -1]

    C. [10, 20, 30, -1, -1]

    D. [10, 20, 30, 30, 30]

13. What will be the output of the following code snippet?

```python
name = "mIcHaEl"
name.replace("I", "i")
name.upper()
print(name)
```

    A. MicHaEl

    B. MICHAEL

    C. mIcHaEl

    D. micHaEl

    E. The code will raise an error

14. What will be the output of the following code snippet?

```python
robot = "Spot"

for r in robot[robot.lower().find("s") : robot.find("t")]:
    print(r, end="")
```

    A. 012

    B. spot

    C. spo

    D. Spo

    E. The code will raise an error

15. The following code represents a board for the game tic-tac-toe where the positions occupied by player 1 are shown with an "X", the positions occupied by player 2 are shown with an "O", and unoccupied positions are shown with a "-".

```
board = [
    "X-X",
    "OXO",
    "OXO"
]
```

Which of the following code snippets will let player 2 occupy the middle position in the top row?

    A. `board[0] = "XOX"`

    B. `board[0][1] = "O"`

    C. `board[0][-2] = "O"`

    D. `board[-3][1] = "O"`

    E. `All of the above`

16. What will be the output of the following code snippet?

```
nums = [100, 2, 3, 40, 99]
print(nums.index(2) * nums[-3:].index(3))
```

    A. `The code will raise an error`

    B. `0`

    C. `1`

    D. `2`

    E. `6`

17. What will be the output of the following code snippet?

```
words = ["one", "two", "three"]
print((",".join(words))[4:7])
```

    A. `two`

    B. `wot`

    C. `wo,`

    D. `,tw`

    E. `The code will raise an error`

18. Assume that the file "content.csv" exists in the current directory and contains the following text:

```
name,net_id,favorite_topping,transportation
bucky,bucky_badger,pineapple,bus
tony,tony_evers,pepperoni,car
frank,frank_lloyd_wright,shrimp,walking
```

In addition, the following function has been provided for you:

```
import csv

def process_csv(filename):
    file = open(filename, encoding="utf-8")
    reader = csv.reader(file)
    data = list(reader)
    file.close()
    return data
```

Then, what will be the output of the following code snippet?

```
data = process_csv("content.csv")
print(data[data[0].index("net_id")][2])
```

    A. pineapple

    B. tony_evers

    C. frank_lloyd_wright

    D. The code will raise an error

19. What will be the output of the following code snippet?

```python
nested_dict = {
    "rizz": {
        "definition": "romantic appeal or charm;  short for charisma.",
        "fun_score": 11
    },
    "bamboozle": {
        "definition": "fool or cheat (someone).",
        "fun_score": 8
    }
}

target = "bamboozle"
for entry in nested_dict:
    if entry == target:
        print(entry["fun_score"], end=" ")
print("Done")
```

    A. Done

    B. 8

    C. 8 Done

    D. Nothing will be printed

    E. The code will raise an error

20. What will be the output of the following code after the user types the letter n when prompted and then hits enter?

```python
try:
    customer_happiness = input("Are you having a good shopping experience?")
    if customer_happiness.lower() != "y":
        raise Exception("The customer isn't happy.")
    print("Happy customer!")
except Exception as e:
    print(e)
```

    A. <class 'Exception'>

    B. The customer isn't happy.

    C. Happy customer!

    D. n

    E. Nothing will be printed due to an error

Power Generators

Assume the function `cell(row_idx, col_name)` (whose inputs are the row index and column name of the data file) extracts data located at a specific row and column from a data file. The following table contains this data:

–	entity_id	entity_name	latitude	longitude	net_winter_capacity
0	4247	Du baly	46.5	-90.5	13
1	123	Saxon FALL	40	-88	16
2	456	Alexander Age	45	-93	5
3	789	Brownie	42	-92	22
4	456	Alexander Age	45	-93	10

For example, the output of `cell(0, "entity_id")` is `4247`. The types of the output of the cell function for each column name is shown below:

- `entity_id`: int

- `entity_name`: str

- `latitude`: float

- `longitude`: float

- `net_winter_capacity`: int

21. What is the output of the following code? The order of elements in the answer choices does not matter.

```
def find_entities_with_phrase(phrase):
    entity_names = []
    for idx in range(5):
        if phrase.lower() in cell(idx, "entity_name").lower():
            entity_names.append(cell(idx, "entity_name"))
    return list(set(entity_names))

Al_name = find_entities_with_phrase("Al")
print(Al_name)
```

    A. `["Du baly", "Saxon FALL"]`

    B. `["Saxon FALL", "Alexander Age", "Du baly"]`

    C. `["Du baly", "Saxon FALL", "Alexander Age", "Brownie"]`

    D. `["Du baly", "Saxon FALL", "Alexander Age", "Alexander Age"]`

    E. `["Alexander Age"]`

22. What is the output of the following code:

```
def num_generators_by(entity_id):
    num_generators = 0
    for idx in range(5):
        if cell(idx, "entity_id") == entity_id:
            num_generators += 1
    return num_generators

num_456 = num_generators_by(456)
print(num_456)
```

    A. 1

    B. 2

    C. 3

    D. 4

    E. 5

Movies

The following list of dictionaries will be referenced in the next 4 questions.

```
movies = [
    {"title": "A", "year": 3, "style": "short", "genres": ["Sci-fi"]},
    {"title": "B", "year": 5, "style": "long", "genres": ["Romance"]},
    {"title": "C", "year": 7, "style": "short", "genres": ["Action"]},
    {"title": "D", "year": 9, "style": "long", "genres": ["Sci-fi", "Romance"]}
]
```

23. What does the following code evaluate to?

```
movies[-1]["genres"][0]
```

    A. `["Sci-fi", "Romance"]`

    B. `"Romance"`

    C. `"Sci-fi"`

    D. `"Action"`

    E. `None of the above`

24. What will be the value of the variable `data after running the code below?`

```
data = []
for x in movies[-1]:
    data.append(x)
```

    A. `["t", "i", "t", "l", "e"]`

    B. `["A", "B", "C", "D"]`

    C. `["Sci-fi", "Romance"]`

    D. `["title", "year", "style", "genres"]`

25. What will be the value of the variable `result` after running the code below?

```python
result = {}
for m in movies:
    for genre in m["genres"]:
        if not genre in result:
            result[genre] = 1
        else:
            result[genre] += 1
```

    A. `{}`

    B. `{"Sci-fi":  2, "Romance":  2, "Action":  1}`

    C. `{"Sci-fi":  3, "Romance":  3, "Action":  2}`

    D. `{"Sci-fi":  2}`

    E. `{"Sci-fi":  1, "Romance":  1}`

26. What will the following code print?

```python
import copy
x = [{"movie": "Barbie", "stars": 4.8},
     {"movie": "Oppenheimer", "stars": 5},
     {"movie": "Killers of the Flower Moon", "stars": 4.5},]
y = copy.copy(x)
x[0]["movie"] = "Interstellar"
print(y[0]["movie"])
```

    A. `"Barbie"`

    B. `"Oppenheimer"`

    C. `"Interstellar"`

    D. `"Killers of the Flower Moon"`

Steam Games

27. Consider the following code:

```python
def bad_format_revenue(rev_string):
  end_char = rev_string[-1]
  mult = 1
  idx = len(rev_string)
  if end_char in ['K', 'M']:
    if end_char=='K':
      mult = 1000
    else:
      mult = 1000000
    idx = -1
  f = rev_string[1:idx]
  return float(f) * mult

rev = ???
print(bad_format_revenue(rev))
```

Which of the following options could replace ??? so that the code prints the float 4500.0?

    A. `4500.0`

    B. `"4.5K"`

    C. `"4500"`

    D. `"$4.5K"`

    E. All of the above

28. What will be the output of the following code? (assume the `bad_format_revenue` function from the previous Steam Data question is defined already)

```
revenue_list = [bad_format_revenue(s) for s in ["$1M", "$5K", "$7.8K", "75000"]]
i = None
for idx in range(len(revenue_list)):
  if i == None or revenue_list[idx] <= revenue_list[i]:
    i = idx
print(i)
```

    A. 0

    B. 1

    C. 2

    D. 3

    E. The code has error(s) and will not run

29. Assume all the functions from the P5 Steam Data notebook and P5 Steam Data project module used here have been defined already.

```
import project

lowest_idx = None
lowest_price = None
for idx in range(project.count()):
  price = format_price(project.get_price(idx))
  if ???:
    lowest_idx = idx
    lowest_price = price
```

Suppose we want the variable `lowest_idx` to hold the index of the game with the lowest price, and in the case of ties we want to find the first such game (lowest index) that appears in the dataset. You may assume that all prices will be non-negative. Which of the following code snippets can replace the ??? in the code to achieve this?

    A. `lowest_idx == None or price < lowest_price`

    B. `lowest_idx == None or (price < lowest_price and idx < lowest_idx)`

    C. `lowest_price != None and lowest_idx != None`

    D. `lowest_price != None and idx < lowest_idx`

    E. None of the above

30. Assume all the functions from the P5 Steam Data notebook and P5 Steam Data project module used here have been defined already.

```
import project

highest_idx = None
highest_price = None
highest_reviews = None

for idx in range(project.count()):
    price = format_price(project.get_price(idx))
    reviews = format_num_reviews(project.get_positive_reviews(idx))

    if highest_idx == None or ???:
        highest_idx = idx
        highest_price = price
        highest_reviews = reviews
```

Suppose we want the variable `highest_idx` to hold the index of the game with the highest price, where ties in price are broken by choosing the game with more positive reviews. You may assume that no two games have the same number of positive reviews. Which of the following code snippets can replace the ??? in the code to achieve this?

A. `price > highest_price and reviews > highest_reviews`

B. `(reviews > highest_reviews and price >= highest_price)`

C. `price > highest_price or (price == highest_price and reviews > highest_reviews)`

D. `(price == highest_price or reviews > highest_price) or price >= highest_price`

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