

Name: _____
Surname: _____
Date: _____

Instructions

- Each question has only one correct answer. Circle the correct option for each question.
- A correct answer awards 1 point.
- An incorrect answer subtracts 0.3 points.
- Leaving a question blank gives 0 points (neither adds nor subtracts).
- Assume each code cell is run in isolation, no other code has been executed beforehand.
- There are 11 questions in total. Only your best 10 answers will be used to compute your final score.

Questions

1. Which of the following do Python list and NumPy arrays have in common?

- A. Both can be indexed with tuples, such as `[1, 0]`.
- B. Both of them are mutable.
- C. Both of them allow broadcasting.
- D. All of the above.

2. We run this code. What will the value of “c” be?

```
1  import numpy as np
2
3  a = np.array([1, 2, 3])
4  b = np.array([[4, 5, 6], [7, 8, 9]])
5  c = b > a
```

- A. True
 - B. `[True, True, True]`
 - C. `[[True, True, True], [True, True, True]]`
 - D. The code will raise an error because shapes do not match.
3. We have a 2D-array “x” of shape (6, 2). Which of the following lines of code will reshape it to a 3D-array of shape (3, 2, 2)? The method `.reshape()` gives a new shape to an array without changing its data.
- A. `x = x.reshape((3, 2))`
 - B. `x = x.reshape((6, 2))`
 - C. `x = x.reshape((3, 2, -1))`
 - D. The original array cannot be turned into that shape.

4. After running this code, what will be **length of “z”**?

```
1 import numpy as np
2
3 x = np.array([3, 4])
4
5 y = np.ones(2) * 2
6 # Return a new array of given shape and type, filled with ones.
7
8 z = np.concatenate([x, y])
9 # Join a sequence of arrays along an existing axis.
```

- A. 2
- B. 4
- C. 6
- D. The code will raise an error.

5. Why will the following code cell fail?

```
1 import numpy as np
2
3 arr = np.arange(4)
4 # Return evenly spaced values within a given interval.
5
6 arr_bool = np.array([True, False, True, False, True])
7 selected = arr[arr_bool]
```

- A. (Line 3) Invalid input for function `np.arange()`.
- B. (Line 6) Arrays cannot be initialized using boolean values.
- C. (Line 7) We cannot index an array (`arr`) with a boolean array (`arr_bool`).
- D. (Line 7) Boolean array does not match the indexed array.

6. The first step of the loop below prints “265”. What will print the second step of the loop?

```
1 import numpy as np
2
3 x = 10
4
5 np.random.seed(x)
6 # Reseed the singleton RandomState instance.
7
8 for _ in range(100):
9     x = np.random.randint(low=0, high=1000)
10    # Return random integers from low (inclusive) to high (exclusive).
11
12    print(x)
```

- A. 10
- B. 265
- C. We cannot predict the outcome of the second step.
- D. The code will raise an error on the second step.

7. Which of the following array declarations will cause an error?

```
1 import numpy as np
2
3 a = np.zeros(3).astype(float)
4 b = np.zeros(3, 3)
5 c = np.ones(5, dtype=bool)
6 d = np.ones((5, 5))
```

- A. (Line 3) Array a
- B. (Line 4) Array b
- C. (Line 5) Array c
- D. (Line 6) Array d

8. What is going to be the value of “wins”?

```
1 import numpy as np
2
3 games = np.array(
4     [[0, 1, 0],
5      [1, 0, 0],
6      [0, 1, 0]]
7 )
8
9 print(games[:, 1])
10
11 wins = np.sum(games) / len(games)
```

- A. 0.3
- B. 0.6
- C. 1.0
- D. The code will raise an error.

9. I want my code below to print the message “Hello” with a 25% chance. Which condition should I use? The function `np.random.uniform()` draws samples from a uniform distribution.

```
1 import numpy as np
2
3 p = 25
4
5 condition = # Change this line
6
7 if condition:
8     print("Hello")
```

- A. `condition = np.random.uniform(p) >= 25`
- B. `condition = np.random.uniform(p) < 25`
- C. `condition = np.random.uniform(100) >= p`
- D. `condition = np.random.uniform(100) < p`

10. What is going to be the final value of “x”?

```
1  import numpy as np
2
3  x = np.array(
4      [[1, 2],
5       [3, 4]]
6  )
7  x[1, :] = 0
```

A. $\begin{bmatrix} 1 & 2 \\ 0 & 4 \end{bmatrix}$ B. $\begin{bmatrix} 0 & 2 \\ 1 & 4 \end{bmatrix}$ C. $\begin{bmatrix} 1 & 2 \\ 0 & 0 \end{bmatrix}$ D. $\begin{bmatrix} 1 & 0 \\ 3 & 0 \end{bmatrix}$

11. When calling `np.sum()`, which keyword argument do we need to use if we want to compute the sum of all elements in each column?

- A. `axis=0`
- B. `axis=1`
- C. `axis=None`
- D. `np.sum()` defaults to that behaviour without the need of any additional argument.

Answers: 1-B, 2-C, 3-C, 4-B, 5-D, 6-C, 7-B, 8-C, 9-D, 10-C, 11-A