IE Informatique et Société Numérique 1
SCAN
December 2024

Duration: 1h
Documents and calculator forbidden

Warning : A program that is **badly indented, badly commented** or with the **wrong choice of variable names** will be **penalized** *(up to -1 point).*

Exercise 1   Course questions (2 pts)

(Q1.1)   To find the position of the minimum in a list of integers, is it better to use : a systematic traversal by value, a systematic traversal by index or a conditional traversal?

(Q1.2)   To find the value of the first element greater than 10 in a list of integers, is it better to use : a systematic traversal by value, a systematic traversal by index or a conditional traversal?

(Q1.3)   To display the number of negative values in a list of integers, is it better to use : a systematic traversal by value, a systematic traversal by index or a conditional traversal?

(Q1.4) Describe in one or two sentences how the floats are distributed on the real axis, i.e. how the distance between two consecutive floats varies.

(Q1.5) BONUS : Explain why the distribution of floats (which you described in the question above) was done this way.

Exercise 2 Code reading (3 pts)

(Q2.1) What does running the following code display?

```
1  s = "!hello"
2  for i in range(1, len(s)):
3      print(s[-i])
```

(Q2.2) Describe in one sentence what the function "ma_fonction" below does.

```
1  def ma_fonction(liste):
2      x = 0
3      for e in liste:
4          x += e
5      return x
6
7  liste = [-1]
8
9  for i in range(2, 4):
10     liste.append(i)
11
12 print(liste)
13 i = 0
14 while ma_fonction(liste) < 8:
15     liste[i] += 1
16     i = (i+1) % len(liste)
17
18 print(liste)
```

(Q2.3)   What does running this code display?

Exercise 3   Codage (3 pts)

(Q3.1)   Give the 8-bit binary representation of the unsigned integer 103_{10}.

(Q3.2)   Give the hexadecimal representation (base 16) of the unsigned binary number $0001\ 1011\ 1110\ 1101_2$.

(Q3.3) Give the decimal representation of the unsigned binary number 0001 0010 0111$_2$.

Exercise 4   Writing code (12 pts)

A travel agency wants to automate some tasks to process information about its offers. You are responsible for developing scripts in Python to meet specific needs of the agency.

The agency offers stays for different destinations. To simplify data management, destinations and certain parameters (costs, high season) are processed using lists. The data may vary over time, but here is an example of data for illustrative purposes :

```
1  list_destinations = ["Paris", "New York", "Tokyo", "Rio", "Sydney"]
```

The costs of stays for each destination are stored in a second list, where the index of each cost corresponds to that of the destination in list_destinations. There is only one cost per destination.

```
1  # cost for Paris, New York, Tokyo, etc.
2  list_costs = [1200, 2300, 1900, 1500, 2200]
```

The agency wants to have a script that automates the search for the cost of a destination among those proposed in the list list_destinations.
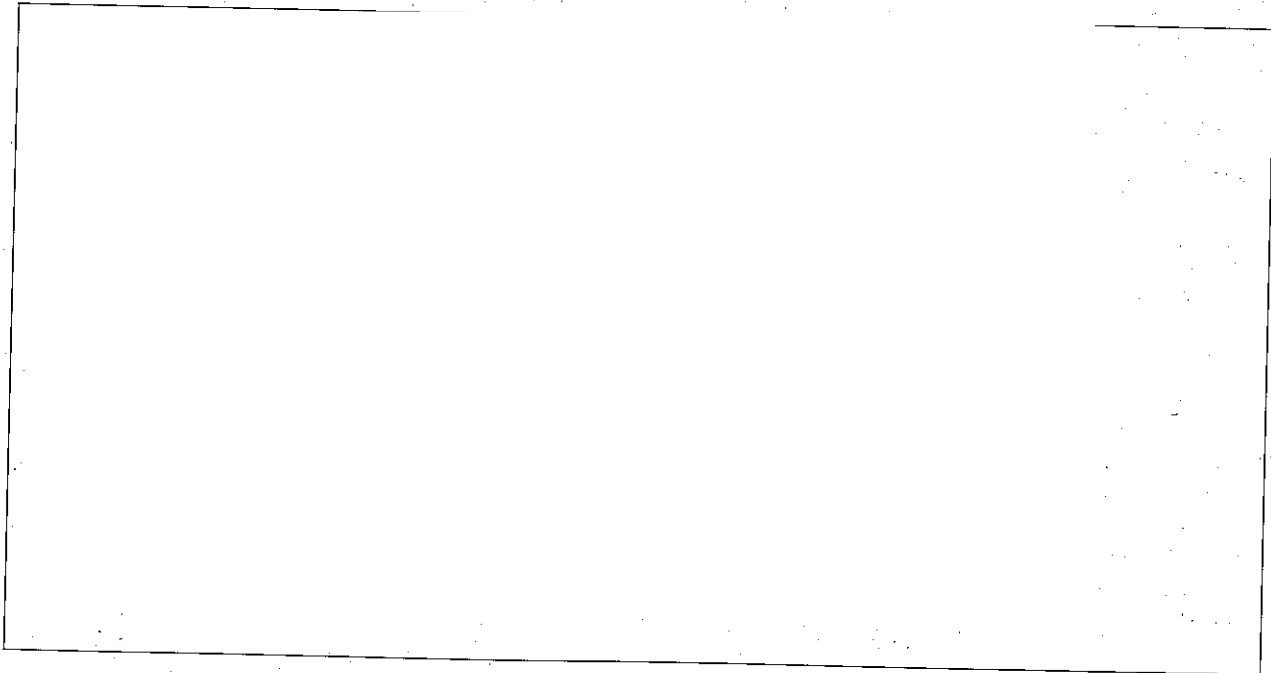
(Q4.1) Write a function cost_destination(list_destinations, list_costs, destination) that returns the cost of the destination given in the third parameter, as shown below. If the destination is not in the list, the function must return -1 and the function must work even for an empty list of destinations. The keyword "in" is forbidden in this question

```
1  # Exemple
2  print(cost_destination(list_destinations, list_costs, "Tokyo"))
3  # should display 1900
4
5  print(cout_destination(list_destinations, list_costs, "Londres"))
6  # should display -1
```
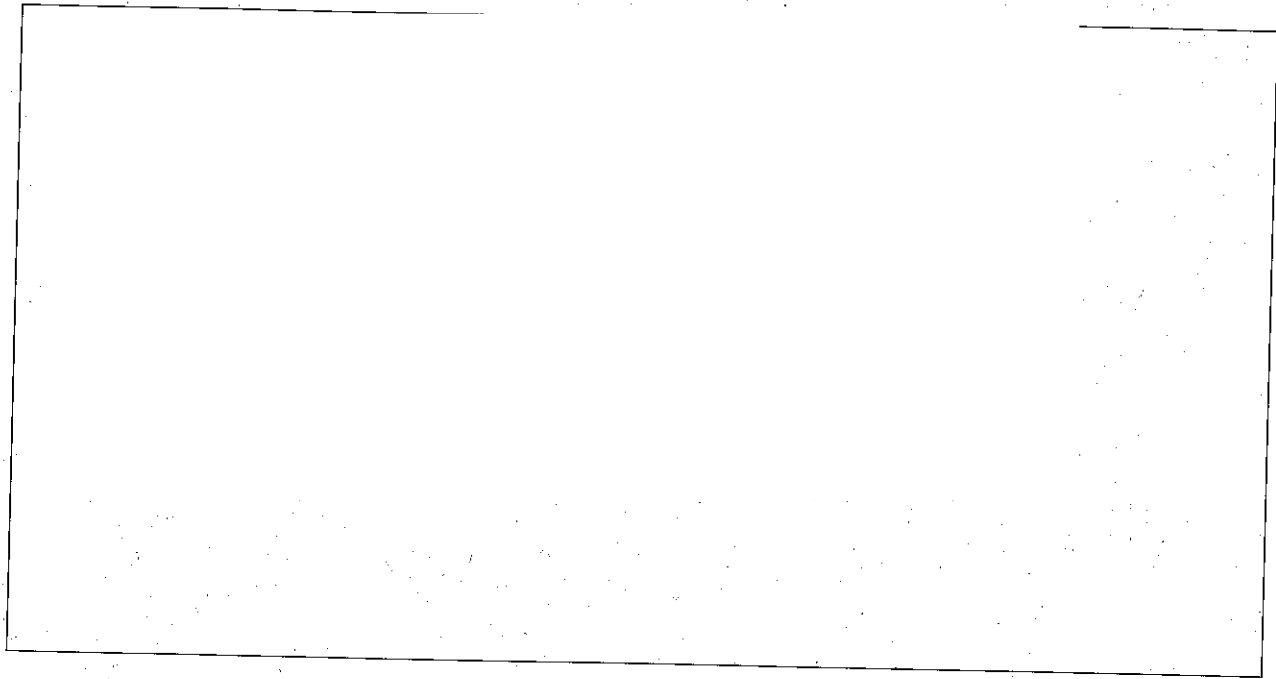
The agency wants to quickly identify stays costing more than €2,000 to avoid surprising customers with prices that are too high.

(Q4.2) Write a pseudo-code algorithm that iterates through each destination and checks if its cost exceeds €2000. This algorithm should display that the trip to the destination is too expensive for each cost greater than €2000 or that all costs are acceptable if no destination has a cost greater than €2000

For some tours, the agency combines several steps (destinations) in an itinerary. It wants to calculate the cumulative sum of costs for each step of the journey.

(Q4.3) Write a function cumulative_sum_tour(list_destinations, list_costs, tour) that returns a new list where each element is the cumulative sum of the costs up to that step, as shown below. If a tour destination is not in list_destinations, the code should print "Warning : [destination] is not a known destination". An example is given below

```
1  tour = ["Tokyo", "Rio", "Paris"]
2  print(cumulative_sum_tour(list_destinations, list_costs, tour))
3  # should display [1900, 3400, 4600]
4
5  tour = ["Tokyo", "London", "Paris"]
6  print(cumulative_sum_tour(list_destinations, list_costs, tour))
7  # should display:
8  # Attention: London is not a known destination
9  # [1900, 3100]
```

The agency wants to know how many stays were booked in high season for specific months.

(Q4.4) Write a function count_stays_high_season(high_season, month_stays) that returns the number of stays booked in high season, as shown below.

```
1  high_season = ["July", "August", "December"]
2  month_stays = ["July", "May", "August", "October", "December"]
3  print(count_stays_high_season(high_season, month_stays))
4  # should display 3
```
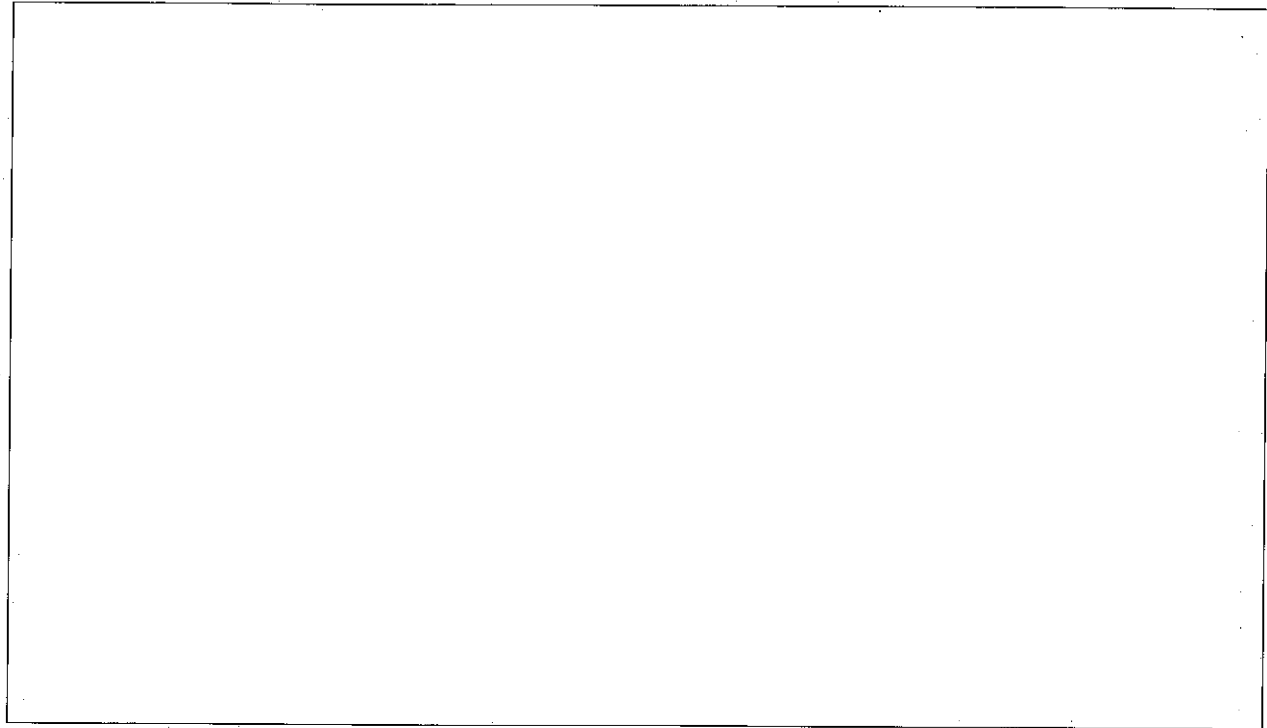
To encourage multi-destination circuit travel, the agency applies a 10% discount on each trip between additional destinations. The initial trip from the starting point to the first destination does not benefit from this discount, but all subsequent trips do.

(Q4.5) Write a function `calculate_cost_tour_discount(list_destinations, list_costs, tour)` that returns the total cost of the tour by applying the 10% discount on all trips except the first, as shown below.

```
1  # Example
2  tour = ["Paris", "Tokyo", "Rio"]
3  print(calculate_cost_tour_discount(list_destinations, list_costs, tour))
4  # should display: 4260 # because 1200 + 1900 * 0.9 + 1500 * 0.9 = 4260
5
6  tour = ["Marrakech", "Paris", "London", "Rio"]
7  print(calculate_cost_tour_discount(list_destinations, list_costs, tour))
8  # should display:
9  #2550 #because 1200 + 1500 * 0.9 = 2550
```