

Assignment 3

Submission

You must submit one ZIP file on Autolab. This ZIP file must be named *userid-hw3.zip* and must include all of the Python files that you have written for this assignment. Please write your name and userid as a comment at the beginning of each Python file.

Recommendations

- **Make sure to test your program.**
- Make sure that your program is executable. If you are unable to complete portions of the assignment, comment out the part of the code that does not work properly, and explain what you did, what worked, and what did not. It is your responsibility to explain as carefully as you can why you think you were unable to get the code working, what you think is wrong, and how you might go about fixing it. The quality of such an explanation will be important to us in deciding whether to give you partial credit.

Instructions

- You are not allowed to use the instruction `print` inside the body of a function. It is recommended to use `print` as the last instruction of your program to print the result of a test.

```
print "The result is ", result
```

During the World Cup 2022, many people from around the world will come to Qatar to support their national teams. The Qatari Government is asking for your help to organize the event.

1 The Currency Convertor [25 points]

In 2022, the football fans will come to Qatar bringing their foreign currencies. The *Ministry of Commerce* needs a program that converts foreign currencies from and to Qatari Riyals.

1.1 From foreign currencies to Qatari Riyal

Write a function `toQAR(amount, currency)` that takes an `amount` (`number`) and a foreign `currency` (`string`) as arguments and returns the corresponding amount in Qatari Riyal (as a `number`)).

- `amount` is the amount in the foreign currency.
- `currency` can be either "USD", "CYN", "EURO" and 2 other currency codes of your choice.

Instructions:

- To get the corresponding change rate, you can type 1 QAR in EURO in Google.
- The function should return the corresponding change for USD (US Dollar), EURO (European Union), CNY (Chinese Yuan) and 2 other currencies of your choice.

1.2 From Qatari Riyal to foreign currencies

Write a function `fromQAR(amount, currency)` that takes an `amount` (`number`) and a foreign `currency` (`string`) as arguments and returns the corresponding change in this currency (as a `number`).

- `amount` is the amount in Qatari Riyal.
- `currency` can be either USD, CYN, EURO and two other currency codes of your choice.

1.3 Test your code

Write a small program that tests your two functions `toQAR` and `fromQAR`. Your test cases should give you sufficient assurance that your program is correct

2 Selling Tickets [25 points]

In 2022, the *FIFA* and the *Qatar Football Association (QFA)* will offer a “Family Discount” on the tickets for the World Cup 2022. The rules to calculate the total price for a “Family Pass” are as follows:

- The price per adult is 250 QAR.
- The price per child is 180 QAR.
- However, for each adult, one child gets a “Family Discount”: 10% discount on the child ticket.
- Moreover, if a person (adult or child) is a member of the *Qatari Football Association*, he or she gets 20 QAR off. This discount should be applied after the “Family Discount”.

2.1 Calculating the “Family Pass” price

Write a function `familyPass(adults, children, members)` that takes the number of `adults` (`number`), the number of `children` (`number`) and the number of QFA `members` as arguments and returns the total price for the given family (as a `number`)).

- `adults` is the number of adults.
- `children` is the number of children.
- `members` is the number of persons that are members of the *Qatari Football Association*.

Instructions:

- The price should be calculated based on the rules described above.

2.2 Test your code

Write a small program that tests your function `familyPass`. Your test cases should give you sufficient assurance that your program is correct.

3 Breaking News [25 points]

In 2022, *Al Jazeera* will broadcast live the games and publish the results on its website. In this perspective, *Al Jazeera* asks you to write a program that will generate the headlines based on the results.

3.1 Generating headlines

Write a function `headline(team1, score1, team2, score2)` that takes two team names `team1` and `team2` (both as `strings`), the number of goals `score1` and `score2` (both `numbers`) and returns the corresponding headline (as a `string`).

- `team1` the name of the first team.
- `score1` the number of goals scored by `team1`.
- `team2` the name of the second team.
- `score2` the number of goals scored by `team2`.

Instructions: For instance, for a game that would involve *Qatar* and *France*, the headline should be either:

- "Qatar won against France (2,1)" if *Qatar* scored 2 goals and *France* 1.
- "Qatar lost against France (0,3)" if *Qatar* did not score any goal and *France* scored 3.
- "Qatar and France tied (1,1)" if both scored one goal.

3.2 Test your code

Write a small program that tests your function `headline`. Your test cases should give you sufficient assurance that your program is correct.

4 Official Tickets [25 points]

The *Ministry of Interior* has raised concerns that fake tickets could circulate during the World Cup. To verify the authenticity of tickets, you have been asked to write a program that can verify whether or not the ticket number, also called a *checksum*, is valid.

4.1 Calculating the checksum

Write a function `checksum(ticket)` that takes a ticket (`number`) as argument and returns whether or not the ticket number is valid (as a `boolean`).

- `ticket` the ticket number can be between 1000 and 1000000000.

Instructions: A ticket is valid when the the sum of all of its digits is a multiple of 11.

4.2 Generating the tickets

Write a function `tickets(lower, upper)` that takes two range bounds `lower` and `upper` (both `numbers`), as arguments and returns a sequence of ticket numbers that have a valid checksum (as a `string`).

- `lower` the lower bound.
- `upper` the upper bound.

Instructions:

- Each ticket numbers that appears in the resulting sequence must have a valid checksum.
- Ticket number are separated by a space in the resulting sequence (returned as a `string`).

4.3 Test your code

Write a small program that tests your two functions `checksum` and `tickets`. Your test cases should give you sufficient assurance that your program is correct. For instance, here is a valid sequence of tickets generated between 1000 and 2000 (`tickets(1000,2000)`):

```
"1019 1028 1037 1046 1055 1064 1073 1082 1091 1109 1118 1127 1136 1145 1154 1163 1172
1181 1190 1208 1217 1226 1235 1244 1253 1262 1271 1280 1307 1316 1325 1334 1343 1352 1361
1370 1399 1406 1415 1424 1433 1442 1451 1460 1489 1498 1505 1514 1523 1532 1541 1550 1579
1588 1597 1604 1613 1622 1631 1640 1669 1678 1687 1696 1703 1712 1721 1730 1759 1768 1777
1786 1795 1802 1811 1820 1849 1858 1867 1876 1885 1894 1901 1910 1939 1948 1957 1966 1975
1984 1993"
```