COSC2429 – Introduction to Programming

Assignment 1 – 2021A

Please submit a zip folder including 4 python files, 1 for each of these questions. They must be named p1.py, p2.py, p3.py, and p4.py accordingly. No capital letter in the file names.

Problem 1:

There is a COVID-19 breakout in your city. The government force everyone to stay at home, and they will distribute the necessities to your door. The item list includes: food, milk, and toilet paper. To save time and money, they can only make 1 delivery per household. The government now ask you to write a program to calculate exactly how much they have to put in each delivery box.

The database you received includes: household id (integer), number of adults (integer), number of children (integer), number of days they must stay inside (integer), special allergies (string: “”, “nut” or “lactose”), and number of adults with medical condition (integer).

You also got a note from the domain expert:

- An adult needs 3 meals (count as 3 food portions in this exercise) and half a liter of milk per day. A child’s food portion is only about 70% of the adult’s one. However, they need 1.5 more milk than the adult.
- On average, 1 toilet paper roll will last 4 days for an adult, 3 days for a child and 2 days for a person with medical condition
- If they don’t have any allergy or have nut allergies, they get cow milk. If they are lactose intolerance, they get almond milk. If they have a medical condition, they get the treatment milk.

All the number MUST always be rounded up, since we cannot deliver 5.1 food portions, 2.3 liters of milk or 4.2 toilet paper rolls.

Your function MUST print out this statement:

“Household id *** will get *** food portions, *** liter(s) of cow milk, *** liter(s) of almond milk, *** liter(s) of treatment milk, and *** toilet paper rolls.”

Your function MUST also RETURN all the above mentioned *** for the government to store the information in another database.

IMPORTANT: Your function must be named and must have the function parameters listed in the same order as below. (I will use a python script with a database to automatically test your function so please don’t do it differently)

```
def item_cal(house_id, no_adult, no_child, no_days, allergies, no_patient):

    # your logic here

    # return must be in the same order as in the print statement

    return house_id, food_qty, cow_milk_qty, almond_milk_qty, tm_milk_qty, toilet_paper_qty
```

Problem 2:

Let's use the turtle module to draw a bar chart for the output of previous problem.

- The bar chart must show the item name and quantity at for each bar (this can be on top or bottom of each bar.
- House_id must be printed on the top of the chart. (hint: use .write() and .goto() function).
- Draw x and y axes (note the max values for the y axis will be different for each household).
- Feel free to have any color design that you want, but please make the color/background color easy to see.

IMPORTANT: Your function must be named and must have the function parameters listed in the same order as below. (I will use a python script with a database to automatically test your function so please don't do it differently)

```
def draw_bar_chart(house_id, food_qty, cow_milk_qty, almond_milk_qty, tm_milk_qty,
toilet_paper_qty):

    # your logic here

    # you don't really need a return statement since it's a drawing, no output variable.
```

Problem 3:

After defining the function to calculate the items for each household, you apply it to the given database. However, you noticed there is something wrong with the data. You suspected data entry errors. Therefore, you write another function to check for data errors. The check includes:

1. The number of adults with medical condition must not be larger than the number of adults in the household.
2. There must be no household with only children and no adult.
3. Number of days they must stay inside must not be shorter than 14 days.
4. All the numbers must be integer, not float.

You MUST write in your own words the print out message for each type of these 4 violations, and it must include the house_id and some number *** explaining data error. For example: "Error type *** in the data of Household id ***: no adult but *** children".

Beside the print statements, the function MUST return the household id and the error type (just return the integer 1, 2, 3, or 4).

IMPORTANT: Your function must be named and must have the function parameters listed in the same order as below. (I will use a python script with a database to automatically test your function so please don't do it differently)

```
def data_check(house_id, no_adult, no_child, no_days, allergies, no_patient):

    # your logic here

    return house_id, error_type
```

Problem 4:

Now we have the vaccines (finally!). However, the supply is limited at the moment. The government need you to calculate the vaccination priority for a list of people. The rules are:

- Anyone whose job is “medical” (short for medical workers) will be the first in line.
- “military”, “diplomatic”, “essential”, and “teacher” will be 2nd,3rd, 4th and 5th in that order.
- We have people over 65 years old coming at 6th.
- Then at 7th we have people who live in the COVID outbreak area, coded as boolean.
- The rest can be listed as priority 8th.

The data will be in a dictionary format with key is the id of the person and value is a list containing the info about job, age and living in the COVID outbreak area. Sample data format:

```
data = {
    3452: [“medical”, 34, True],
    6346: [“teacher”, 52, False],
    …
}
```

You have to write a python function to return a dictionary with key is the id of the person and value is the priority number for each person. The output dictionary should be:

```
output = {
    3452: 1,
    6346: 5,
    …
}
```

IMPORTANT: Your function must be named and must have the function parameters listed in the same order as below. (I will use a python script with a database to automatically test your function so please don’t do it differently)

```
def priority_cal(data):
    # your logic here
    return output # this must be a dictionary, not any other data type.
```

Feel free to contact me if you need help. Goodluck have fun!