Python exercises from previous exams in 2021-22
(for the solutions, you can run the code)

June 23, 2022

Consider the following fragment of Python code:

```
import pandas as pd

def my_selection(a, b):
   if a > b:
      return a
   elif a == b:
      if a % 2 == 0:
         return 20
      else:
         return 13
   else:
      return b

table = {'A': [1, 2, 12], 'B': [4, 5, 6], 'C': [7, 8, 9]}

df = pd.DataFrame(table)

tmp = [max(df[c]) for c in df.columns]

array = list(df['A'] + df['B'] + df['C'])

for i in range(len(tmp)):
   print(my_selection(b=array[i], a=tmp[i]))
```

1. Provide a qualitative description step by step, in simple terms, of the program workflow.
2. Replace the built-in min function with a custom fuction that computes the minimum of a list of integer numbers.
3. Which are the differences between a set and a list data type?

January 25, 2023

Consider the following fragment of Python code:

```
import random
import statistics as stat
my_list = [1, 'a', 3, 2]
my_diz = {key: [random.randint(0, 10) for _ in range(10)] for key in my_list}
tmp = {}
```

```
def my_fun(ll, delta=1):
    return stat.mean(ll) + delta

for a in my_diz:
    tmp[a] = sum(my_diz[a])
    my_diz[a] = my_fun(my_diz[a])
```

Then please answer the following questions:

1. Provide a qualitative description step by step, in simple terms, of the program workflow.
2. Implement a function that given a list return a boolean according whether there is at least a list item whose type is a float.
3. Which and why is the best combination of basic python data structure to store the grades of the students identified by a unique ID?

July 11, 2022

Consider the following fragment of Python code:

```
import pandas
from statistics import mean

a = {'A': [1, 2, 3], 'B': [4, 5, 6], 'C':  [7, 8, 9]}
b = {'B': [4, 3, 7], 'C': [4, 3, 1], 'A':  [2, 6, 9]}

def my_function(A, B):
    tmp = {}
    s1 = set(A.keys())
    s2 = set(B.keys())
    for k in s1.union(s2):
        if k in B and k in A:
            tmp[k] = A[k] + B[k]
        elif k in A:
            tmp[k] = A[k]
        else:
            tmp[k] = B[k]
    return tmp

DF_ = pandas.DataFrame(my_function(a, b))
tmp = ()
```

```
for c in df.columns:
    tmp.append(mean(df[c]))

print(tmp)
```

September 2022

```
import random
import pandas as pan


my_list = [1, 'a', 3, 2]
my_diz = {key: [random.randint(0, 10) for _ in range(10)] for key in my_list}

df = pan.DataFrame(my_diz)
df = df[df[1] + df[2] - df['a'] > df[3]]

tmp = set([])

for index, row in df.iterrows():
    tmp.add(row[1])

print(sum(tmp))



# 1. Provide a qualitative description step by step, in simple terms, of the program workflow.

# 2. Implement a function that given a value and a list return a boolean according whether the value is in the list or not.

# 3. List the rules to define a variable name.
```