Programming

New Austrian Coding School

week 7 - exercises

Exercise 1

Hansel is organizing a party at his place and he has asked his friends to contribute with a little bit of money. After gathering all of it, he wants to know how much he can work with.
Develop the following code:

a. A *MoneyCollector* class that provides a collection containing all the different payments from his friends. You can generate these numbers randomly so that his ten friends always pay each between one and five Euro.
b. A *MoneyCalculator* that receives *money* numbers and returns the accumulated value.
c. Test the behavior of the *MoneyCalculator*.
d. An application that displays on the screen the money collected from each friend and also the total.

Exercise 2 [problem solving - level 1]

Derek, Matilda and Hansel have started using nicknames for everything they encounter. They started playing around by just saying the first half of any word.
Develop the code that they use in order to create nicknames out of those words.
Test your code to make sure the nickname logic works, even if the provided name is empty.

```
Input:
"House", "tree", "Theatre", "somewhere", "bottle"
Output:
"Ho", "tr", "The", "some", "bot"
```

Exercise 3 [problem solving - level 2]

Develop a code that receives a collection of numbers and returns the biggest and the smallest numbers.
Create tests for that code.

Exercise 4 [problem solving - level 2]

Develop a code that receives a positive number and returns a collection of the individual numbers that form that number.
Create tests for that code.

```
Input number: 4653 | Output collection: [4, 6, 5, 3]
Input number: 193822 | Output collection: [1, 9, 3, 8, 2, 2]
```

Exercise 5 [problem solving - level 3]

A palindrome is a word, phrase, or sequence that reads the same backwards as forwards, e.g. *madam* or *nurses run*.
Develop a code that receives a word and checks whether it is a palindrome and returns true or false.
Create tests for that code.

Exercise 6 [problem solving - level 3]

Hansel and Matilda watched a movie trailer recently about secret agents and decided to surprise Derek with a film evening this weekend. In the film, the main character enters an electronics shop and asks for the price of a particular item. Then the shop assistant says the price and depending on the numbers of that given price, they have to perform a secret handshake. After doing it right, he receives the secret mission. If he were to fail, then a hidden lasser ray would immediately vaporice him.
The handshake has the following characteristics:

- There are four kinds of handshake moves: *thumb touches back, tickles over palm, bro knock* and *thousand knuckles*.
- The different moves of the handshake will be performed exactly in the order that the numbers appear within the price number.
- The *thumb touches back* is performed on the number 2.
- The *tickles over palm* is performed on the number 5.
- The *bro knock* is performed on the number 6.
- The *thousand knuckles* is performed on the number 9.

Develop the following code:

a. Create the class *SecretHandshakeMovesTranslator* that has a method that receives a number and returns the collection containing the different handshakes in the right order that the secret agent has to perform to receive the secret mission.
b. Create the class *SecretHandshakesApplication* that shows the interaction with the translator.
c. Create the *SecretHandshakeMovesTranslatorTest* that makes sure its translations are correct.

```
   -  Good evening, how much does this item cost?
   -  195
(The shop assistant knows the right handshake is the following)
["Thousand knuckles", "Tickles over palm"]
(If the result of the secret agent is the same, then he will give him the mission)
(Otherwise he will activate the laser ray and will vaporice the impostor)
```

Exercise 7 [problem solving - level 4]

Matilda is organizing an event for celebrities and they need to pick them up from the hotel and bring them to the event hall. But there are some complications.

- The company has only two kind of vehicles.
- The type 1 of vehicle can transport only one person.
- The type 2 of vehicle can transport only five people.
- The number of celebrities showing up for the event could change at any time.
- Matilda needs to be able to know if they have enough vehicles of both kinds to transport all celebrities.

Develop the following code:

a. Define the class *Transporter* that has a method that receives the number of vehicles of type 1 and the number of vehicles of type 2 that the company is going to provide for the transportation as well as the number of celebrities that they have to transport. This method returns true if those vehicles are enough to transport every celebrity. Otherwise it returns false.
b. Write a code that asks for the number of vehicles of type 1 and 2, and also for the number of celebrities and says if it is possible to transport all of them.

Exercise 8 [problem solving - level 5]

Matilda watches a documentary about the old Roman empire. They conquered most of Europe and ruled it for hundreds of years. They are attributed many inventions, but one thing they never discovered though was the number zero. This made writing and dating extensive histories of their exploits slightly more challenging, but the system of numbers they came up with is still in use today.

The Romans wrote numbers using letters : I, V, X, L, C, D, M. (notice these letters have lots of straight lines and are hence easy to hack into stone tablets). You can find more information about the Roman numeric system here.

- Develop a program that receives a normal number and returns a Roman numeral.
- Extend the program before so that it can also receive a Roman numeral and return its value as normal number.
- Provide a visual interface for both parts.
- Provide tests for both parts.

```
-- Roman calculator --
1 - From number to Roman numeral
2 - From Roman numeral to number
3 - Exit
Choose an option: 1
Provide the number: 10
The Roman numeral of 10 is X
-- Roman calculator --
1 - From number to Roman numeral
2 - From Roman numeral to number
3 - Exit
Choose an option: 2
Provide the Roman numeral: VII
The number of VII is 7
-- Roman calculator --
1 - From number to Roman numeral
2 - From Roman numeral to number
3 - Exit
Choose an option: 3
-- Goodbye.
```

Exercise 9 [problem solving - level 5]

Hansel is reading a book and suddenly spots a spelling mistake and wonders, how do computer dictionaries work? Develop an application that checks the spelling mistakes within one text, comparing them with a previously loaded dictionary.
Use the *words.txt* file as a dictionary.
Available books: *alice's-adventures-in-wonderland.txt, dorian-gray.txt, dr.jekyll-and-mr.hyde.txt, dracula.txt, frankenstein.txt, metamorphosis.txt, moby-dick.txt, sherlock-holmes.txt, the-republic.txt*

```
Number of words checked: ...
Number of misspelled words: ...
Misspelled words: [ ... , ... , ... ]
```

Exercise 10 [problem solving - level 6]

An anagram is a word, phrase, or name formed by rearranging the letters of another, such as *spar*, formed from *rasp*.
Develop a program that generates all two-word anagrams of the word *documenting*.
Use the *anagram-words.txt* file as dictionary.

```
Two-word anagram combinations for the word documenting
Number of combinations: 64
Possible combination: centimo dung
Possible combination: detuning com
Possible combination: tung demonic
Possible combination: med counting
Possible combination: mut encoding
Possible combination: gin document
Possible combination: coding unmet
Possible combination: tuned coming
(...)
```