DIT376 Python for Data Science
Assignment 8 – Individual Assignment!

There are two problems in this assignment.
To submit:

- A Jupyter notebook (.ipynb) with clearly marked solutions for: Problem 1 and Problem 2. The notebook must show examples that you used to run the codes, and the outputs that you get after running the codes.
- An html file (a result of "Save and Export Notebook As" html of your Jupyter notebook) or a link to your project if you are using Deepnote or Colab, after you run all the codes.

Note:

- If you add any details or make any assumptions, clearly describe these in your submission.

1 Using stack and queue

Palindrome is "a word, verse, or sentence (such as "Able was I ere I saw Elba") or a number (such as 1881) that reads the same backward or forward", based on the definition from Merriam Webster dictionary. The task here is to write a program that uses both stack and queue data structures (in the same program) to check if a given input is a palindrome.

Requirement specification:

- Use both stack and queue in the program
- Maximum size of the stack: half the size of the input rounded down.

- Maximum size of the queue: half the size of the input rounded up.
- The program should handle different types of inputs, e.g., Integer and string.

Some input examples are given below.

```
if __name__ == '__main__':
    #    print("This program checks if your text is a palindrome!")
    #    text = input('Please enter your text: ' )
    #    check_palindrome(text)

    # True
    print("...True...")
    print(check_palindrome("tattarrattat"))
    print(check_palindrome("Able was I ere I saw Elba"))
    print(check_palindrome("jajjjjaj"))
    print(check_palindrome("jajjjaj"))
    print(check_palindrome("jaJjjaJ"))
    print(check_palindrome("1881"))
    print(check_palindrome("181"))

    # False
    print("...False...")
    print(check_palindrome("jaxxj"))
    print(check_palindrome("jajaja"))
    print(check_palindrome("18818"))
```

The output:

```
...True...
True
True
True
True
True
True
True
...False...
False
False
False
```

2 Analysing education dataset

Your team mate has started working on exploring a new dataset (the dataset that is used in L15 and L16), but has to leave the task due to other urgency. The last status of the notebook was at the same stage as the notebook in L16. You are asked to continue the work and help the institution that collects the data to answer the following questions.

Your tasks:

- What are the subjects that are particularly bad in terms of having high dropout?
- What are the subjects that are particularly successful?
- The institution wants to save resources by closing the evening classes. Does the data support for or against the institution's plan?
- Is there any correlation between "Previous qualification (grade)" and "Admission grade"? If so, how strong/how weak is the correlation?
- How do the female and male students compare in terms of dropout?
- What is the age at enrollment, at which we see a turning point from more graduate to more dropout?

Answer the questions through analysis and support your answers with visualisations. If you are not sure about the questions, write how you interpret the questions.

Comment on what you observe/found while doing the tasks. Explain every step that you are doing. Assume the readers cannot read your codes.