13 Exercises

1. Write a function `calculate_sample_variance(data)` that accepts a list of numbers and calculates the sample variance.

2. Define a function `filter_even_numbers(numbers)` that takes a list of integers and returns a new list containing only the even numbers from the original list.

3. Create a function `count_vowels(string)` that takes a string as input and returns the count of vowels (`a, e, i, o, u`) in the string, ignoring case.

4. Create a function `reverse_string(string)` that takes a string as input and returns the string reversed.

5. Write a function `calculate_factorial(n)` that takes a non-negative integer `n` and returns its factorial.

6. Define a function `merge_dictionaries(dict1, dict2)` that takes two dictionaries and merges them into a single dictionary. For
   - `dict1 = { 'a': 1, 'b': 2 }` and
   - `dict2 = { 'b': 3, 'c': 4 }`

   `merge_dictionaries(dict1, dict2)` should return `{ 'a': 1, 'b': 3, 'c': 4 }`.

7. Define a function `merge_dictionaries(dict1, dict2)` that takes two dictionaries and merges them into a single dictionary. If there are overlapping keys, sum their values. For example:
   - `dict1 = { 'a': 1, 'b': 2 }`
   - `dict2 = { 'b': 3, 'c': 4 }`

   `merge_dictionaries(dict1, dict2)` should return `{ 'a': 1, 'b': 5, 'c': 4 }`.

8. Write a function `roll_dice(num_rolls)` that accepts the number of rolls as an argument and generates the results of rolling a six-sided die the specified number of times. Use the `random` module.

9. Define a function `generate_random_password(length)` that generates a random password containing uppercase letters, lowercase letters, digits, and special characters. The length of the password should be specified as an argument. Use the `random` module. **Hint:** Look into the `random.choice()` function to select random characters.

10. Create a function `calculate_mean(numbers)` that takes a list of numbers as input and returns the mean (average) value.

11. Create a function `count_occurrences(data, target)` that takes a list and a target value, and returns the number of times the target appears in the list.

12. Write a function `trimmed_mean(grades, percentage)` that takes a list of grades and a percentage as input.

The function should remove the specified percentage of the highest and lowest grades and then return the mean of the remaining grades. Ensure to handle cases where the percentage might result in removing more grades than are available.

14 Exercise Solutions

Solutions to these problems can be found on the following GitHub page:
https://github.com/NaserNikandish/Python_For_Data_Analysis
You can also access the same link using the QR code below:

15 References

References and Resources

The following references and resources were used in the preparation of these materials:

1. Official Python website at https://www.python.org/.
2. *Introduction to Computation and Programming Using Python*, John Guttag, The MIT Press, 2nd edition, 2016.
3. *Python for Data Science Handbook: Essential Tools for Working with Data*, Jake VanderPlas, O'Reilly Media, 1st edition, 2016.
4. *Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython*, Wes McKinney, O'Reilly Media, 2nd edition, 2017.
5. *Introduction to Python for Computer Science and Data Science*, Paul J. Deitel, Harvey Deitel, Pearson, 1st edition, 2019.
6. *Data Visualization in Python with Pandas and Matplotlib*, David Landup, Independently published, 2021.
7. *Python for Programmers with Introductory AI Case Studies*, Paul Deitel, Harvey Deitel, Pearson, 1st edition, 2019.
8. *Effective Pandas: Patterns for Data Manipulation (Treading on Python)*, Matt Harrison, Independently published, 2021.
9. *Introduction to Programming in Python; An Interdisciplinary Approach*, Robert Sedgewick, Kevin Wayne, Robert Dondero, Pearson, 1st edition, 2015.
10. Python tutorials at https://betterprogramming.pub/.
11. Python learning platform at https://www.learnpython.org/.
12. Python resources at https://realpython.com/.
13. Python courses and tutorials at https://www.datacamp.com/.