

Sample Midterm

Select five of the following six exercises:

- (1) Write a function of n that returns the value of $\sum_{i=1}^n \frac{1}{\log(i^2 + 1)}$.
- (2) Write a function of a list that randomly selects one of the elements of the list. All elements of the list should have an equal chance to be chosen.
- (3) Write a function that takes as argument the name of the file. The function returns the two most frequent letters in the file. Digits, punctuation marks, diacritics, et cet. do not count, but only the letters in the English alphabet.
- (4) Write a function of a list of integers. The function returns the count and the sum of the elements in the list as a tuple.
- (5) Write a function that takes as input two file names. The file named by the first argument is supposed to contain a variable number of integers per line. The function writes the sum of these integers per line in a new file with a name given by the second argument.
- (6) Write a function that opens up an existing text file with the default encoding utf-8. The function then calculates and returns the number of lines in the file. Lines that cause a `UnicodeDecodeError` still count. Because we might have an error when reading a line, we will start out by using `readline()`. The latter returns an empty string (which is equivalent to a Boolean `False`) at the end of the file, while an empty line returns `"\n"`.

```
def count_lines(filename):
    count = 0
    with open(filename) as infile:
        while True:
            line=infile.readline()
            if not line:
                break
            count += 1
    return count
```