Additional Exercises

Group 06 - Moritz Makowski

This is just a collection of some exercises.

Please try to solve them before looking at the solutions.

There are many possible solutions to a given problem. The given solutions are just the ones I came up with.

Exercise 1: Average Lifetime of bacteria

Write a simulation to determine the average lifetime of individual bacteria organisms. Each individual organism dies with a probability p after one timestep.

You may use the following lines to generate a random number.

```c
#include <stdlib.h>
#include <time.h>

int main() {
    srand(time(NULL));
    int my_random = rand() % 42;  // A random integer between 0 and 42
}
```

Solution: `exercise_1_average_lifetime_of_bacteria.c`

Exercise 2: Rock-Paper-Scissors

Write a program that plays Rock-Paper-Scissors against a human player.

You may use the following lines to generate a random number.

```c
#include <stdlib.h>
#include <time.h>

int main() {
    srand(time(NULL));
    int my_random = rand() % 42;  // A random integer between 0 and 42
}
```

Solution: `exercise_2_rock_paper_scissors.c`

Exercise 3: Anlyse Parentheses Logic

Write a program that test wether a given string including parentheses (`(` and `)`) is fulfilling two regular rules for setting parentheses:

1. For every opening parentheses there exists a closing parentheses and vice versa
2. Every closing paretheses appears after the respective opening parentheses.
3. Other characters do not play a role in this logic

Solution: `exercise_3_parentheses_logic.c`

Super Bonus: Expand your program to support different types of braces -> `(` / `)`, `{` / `}`, `[` / `]`. It is important that they don't interfere with each other, e.g. `([...)]` is invalid!

Exercise 4: Calculate the Checksum (Quersumme)

Write a program the calculates the checksum of a decimal number.

Solution: `exercise_4_calculate_checksum.c`

Exercise 5: Calculate Harshad-Numbers (Wikipedia)

An integer number is called harshad number if it is evenly dividable by its checksum.

Write a program that calculates the first 50 harshad-numbers.

Solution: `exercise_5_harshad_numbers.c`

Exercise 6: Calculate Perfect Numbers (Wikipedia)

An integer number is called perfect number if it is equal to the sum of its even divisors:

The first two perfect numbers are:

- 6 = 3 + 2 + 1
- 28 = 14 + 7 + 4 + 2 + 1

Write a program that calculates the first 4 perfect numbers.

More Exercises

Coming soon!

All **code examples** and **exercise solutions** on **GitHub**.

https://github.com/dostuffthatmatters/Engineering-Informatics-1-MSE-WS1920.