

National University of Singapore  
School of Computing  
CS1010S: Programming Methodology  
Semester I, 2024/2025

**Tutorial 2**  
**Recursion & Iteration**

Release date: 26<sup>th</sup> August 2024

**Due: 1<sup>st</sup> September 2024, 23:59**

## General Restrictions

- No importing additional packages unless explicitly allowed to do so.
- Do not use any compound data structures, such as `tuple`, `list`, `dict`, `set`, etc.

## Questions

1. Implement a function `sum_even_factorials` that finds the sum of the factorials of the even numbers that are less than or equal to  $n$ , where  $n \geq 0$ .

Sample Execution:

```
>>> sum_even_factorials(1)
1
>>> sum_even_factorials(3)
3
>>> sum_even_factorials(6)
747
```

2. We want to define a function `star_wars_function` that takes in an argument `num_enemy_ships` and returns a string command to take down all the enemy ships. The string command will comprise of alternating beams: `'*-'` and `'*--'`.

Sample Execution:

```
>>> star_wars_function(3)
'*-*--*-'
>>> star_wars_function(6)
'*-*--*-*--*--*'
>>> star_wars_function(0)
''
```

- (a) Implement the function `star_wars_function` by means of a iterative process.
  - (b) Implement the function `star_wars_function` by means of an recursive process.
3. Implement a function that will return the number of digits in an integer.

Assume that the input integer is non-negative. Other than the number 0, all other integers will not begin with the number 0.

**RESTRICTIONS:** You are **not** allowed to convert the integer into a string. You **must** use recursion or iteration to solve this problem.