ETH
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# Programming Techniques for Scientific Simulations Exercise 3

HS 10
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### Problem 3.1 Library on Simpson Integration

1. Write a C++ function to perform Simpson definite integration using function pointers.

2. Compile the function as a static library, ie. *libintegration_simpson.a* and place it under the *lib* directory.

3. Write a documentation using *html* format with filename *integration_simpson.html* and place it under the *doc* directory. In the documentation, say the purpose of the function, its synposis (arguments, argument type and return type), the preconditions and postconditions and etc.

### Problem 3.2 The $\mathcal{Z}_2$ finite group

Mathematically, $\mathcal{Z}_2 = \{+, -\}$ and the group operations are defined as

$$+ * + = + \quad (1)$$
$$+ * - = - \quad (2)$$
$$- * + = - \quad (3)$$
$$- * - = + \quad (4)$$

Write a Z2 type such that it overloads the $*$, $=$, and $<<$ operators. *(You may make use of classes, structs or otherwise.)*

In the end, your Z2 type can support the following for example:

```
Z2 a = Plus;
Z2 b = Minus;
Z2 c = a * b;
std::cout << c << std::endl;
```