

**Homework # 10**

**01286131 Object-Oriented Programming**

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By

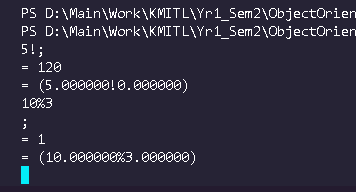
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# Object-Oriented Programming Homework #10 Apr 7th, 2023 Objects and Programs (Part 2)

1. Use the supplement "Simple Calculator" project as a starting point for extending the calculator program.
   1. Suppose that we want to support modulo (%) operator in the calculation expression. Modify grammar to allow expressions with modulo (%) operator.
   2. Use the grammar in **1.1)** and modify the calculator program to allow expressions with modulo (%) operator and its calculation.
   3. Suppose that we want to add a factorial operator by using a suffix ! operator to represent

"factorial". For example, the expression 7! means 7 ~~\*~~ 6 ~~\*~~ 5 ~~\*~~ 4 ~~\*~~ 3 ~~\*~~ 2 ~~\*~~ 1. Make ! bind tighter than ~~\*~~ and /; that is, 7\*8! means 7\*(8!) rather than (7\*8)!. Write a new grammar to account for a higher-level operator.

* 1. Use the grammar in **1.3)** and modify the calculator program to support factorial calculation. To agree with the standard mathematical definition of factorial, let 0! evaluate to 1. As we deal with doubles, but factorial is defined only for ints, so just for x!, assign the x to an int and calculate the factorial of that int.



1. Create a program for evaluating bitwise logical expressions.
   1. Write a grammar for bitwise logical expressions. A bitwise logical expression is much like an arithmetic expression except that the operators are ~~~~~ (complement), & (and), | (or), and ~~^~~ (exclusive or). Each operator does its operation to each bit of its integer operands. ~~~~~ is a prefix unary operator. A ~~^~~ binds tighter than a | (just as ~~\*~~ binds tighter than ~~+~~) so that x|y^z means x|(y^z) rather than (x|y)^z. The & operator binds tighter than ~~^~~ so that x~~^~~y&z means x^(y&z).
   2. **Text

      Description automatically generated**Use the grammar in **2.1)** to create a program for evaluating bitwise logical expressions.