

Expressions

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Before We Begin

- Make sure you have Java and the Java JDK downloaded on your computer
 - can run **java -version** in terminal to check
- Make sure you have IntelliJ downloaded on your computer

Vocab Alert!

operator: combines multiple values or expressions

- ex: + - / * %

expression: a combination of values and / or operations that results in a new value

- ex: $1 + 4 * 5 (7 + 2) * 6 / 3$

The Modulus (%) Operator

Modulus is a way to get the division remainder between 2 numbers.

Examples:

- **$14 \% 3 = 2$**
 - since $3 * 4 + 2 = 14$
- **$8 \% 2 = 0$**
 - Modding by something that goes into the first number evenly will always give 0
- **$230857 \% 10 = 7$**
 - Able to get the last digit of any number by modding with 10 (get last 2 by modding 100 and so on)
- **$3 \% 7 = 3$**
 - Modding a small number by a larger one will always give the smaller number again
- **$12.4 \% 3.0 = 0.400000000000000036$**
 - Confused by the extra digits? Doubles aren't represented in an exact way in the computer so sometimes you'll get output like this with them

Integer Division

When 2 ints are divided the result is another int that is the exact number of times one number goes into the other

Examples:

- $21 / 5 = 4$
- $84 / 10 = 8$
- $30 / 6 = 5$
- $8 / 9 = 0$

Note: If want to get exact division with integers will need to cast one to a double

- ex: $(\text{double}) 21 / 5 = 4.2$

Operator Precedence - PEMMDAS

Please - parenthesis

Excuse - exponents

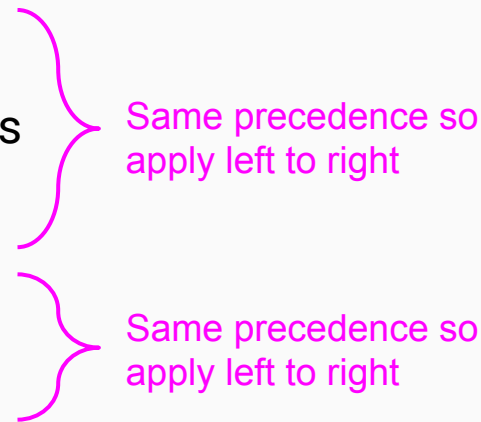
My - multiplication

Marvelously - modulus

Deranged - division

Aunt - addition

Sally - subtraction



Same precedence so
apply left to right

Same precedence so
apply left to right

Note: printing variables/ expressions with words

When you are printing variables/expressions with words you **must** always include a + between the variable/ expression and the words in quotes, you will get a compile error otherwise.

Also, once you have done “some words” + variable/expression it becomes a non number type and any other operations will no longer work as they normally would unless put inside of parenthesis.

- ex: `System.out.println("hello world" + 3 + 4);` → hello world34

Practice Problem

Write a program to calculate your total at a restaurant based on the subtotal. You must calculate both tax and tip and add them to the subtotal to get your final total. Print information as though it was a normal receipt.

Note: tax is 8% and the tip should be 15% of the subtotal *after* tax has been added

Hint: Use variables along the way to hold your intermediate values

The End