

Evaluating Arithmetic Expressions

How to evaluate arithmetic expressions: Integer division, precedence

Arithmetic Operators

- The arithmetic operators are +, -, *, / and %
- They operate just as you would expect, e.g. what is the value of this expression

$5 * 4;$

Arithmetic Operators

- Be careful of integer division; it always results in an integer, what is the value of the following expression?

$17 / 3;$

The expression $17 / 3$ has a value of 5, the result of the division with any remainder discarded

Arithmetic Operators

- The modulus operator, %, takes the remainder of two operands

Expression	Value	Comment
$7 \% 3$	1	remainder of 1
$10 \% 5$	0	divides exactly
$19 \% 4$	3	

Order of evaluation

What is the value of

$2 + 3 * 4$

- a) it depends
- b) 14
- c) 20
- d) none of the above

Order of Evaluation

$a + b / 2$

- As in algebra, the multiplication and division operators bind more strongly than addition and subtraction. (I.e. they have higher precedence.)
- If you want to perform the addition first, you must use parentheses

$(a + b) / 2$

Complex expression

$$b * b - 4 * a + c / 2 * a$$

- First perform all multiplication and division (from left to right)

$$\underline{b * b} - \underline{4 * a} + \underline{c / 2 * a}$$

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- Finally perform the addition and subtraction (again from left to right).

Precedence Rules for Evaluating Expressions

Parentheses (brackets)

*Highest
precedence*

Unary operators + - !

Binary arithmetic operators * / %

Binary arithmetic operators + -

Relational operators < > <= >=

Relational operators == !=

Logical operator &&

Logical operator ||

*Lowest
precedence*

Questions?