EXPRESSIONS

zyBook 2.2, zyBook 2.4, zyBook 2.5, zyBook 2.8, zyBook 2.12

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EXPRESSION

- A simple value or set of operations that produces a value
  - Operator → indicate operation to be performed
  - Operand → value in the expression
  - E.g.
    - (3 + 29) – (4 * 5)

ARITHMETIC OPERATORS

- Addition Operator: +
- Subtraction Operator: –
- Multiplication Operator: *
- Division Operator: /
  - 11 / 2 = 5
- Remainder (Mod) Operator: %
  - 11 % 2 = 1

When the arithmetic operators are performed on two integers, the result will be an integer.

When an arithmetic operation is performed on at least one real number, the result will be a real number.

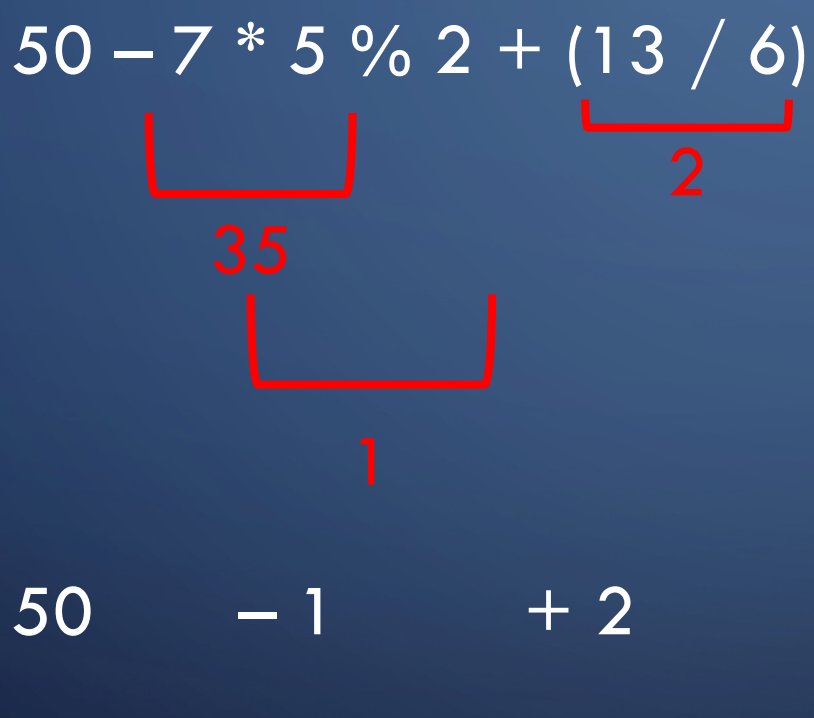
INTEGER DIVISION: SPECIAL CASES

- Numerator smaller than denominator
  - 1 / 3 = 0
  - 1 % 3 = 1
- Numerator of 0
  - 0 / 3 = 0
  - 0 % 3 = 0
- Denominator of 0
  - Division and mod are undefined
  - Produces runtime error

PRECEDENCE

- Precedence: The binding power of an operator, which determines how to group parts of an expression. (Order of evaluating the operations)
- Evaluate left to right. Therefore, if two operations are at the same precedence order, evaluation from left to right, and
    1. Parentheses: ()
    2. Unary operators: +, -
    3. Multiplicative operators: *, /, %
    4. Additive operators: +, –

1. Parentheses: ()
2. Unary operators: +, -
3. Multiplicative operators: *, /, %
4. Additive operators: +, –



MIXING TYPES – PROMOTION

- Promotion
  - A widening primitive conversion that does not lose information about the value
  - Occurs automatically whenever one of the operands is a double and the other is an int
  - E.g.
    - 23.0 / 4 = 23.0 / 4.0 = 5.75

MIXING TYPES – CASTING

- Casting
  - A narrowing primitive conversion that loses information about the value (truncating)
  - Requires cast (put the name of the type you want in parentheses in front of value you want to cast)
    - (int) 4.16 = 4
    - (int) 4.75 = 4

MIXING TYPES – CASTING

- Casting
  - Only casts value immediately following cast
    - 23 / 2 = 11
    - (double) 23 / 2 = 11.5 → 23.0 / 2.0 = 11.5
    - (double) (23 / 2) = 11.0 → (double) 11 = 11.0
  - Example application

If a number is a double, there is at least one decimal place listed

Q: We have some books that are 0.15 feet wide and we want to know how many of them will fit in a bookshelf that is 2.5 feet wide.

A: (int) (2.5 / 0.15) = 16

ONE MORE EXAMPLE