Lecture 5: Numeric Data Types and Operations

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Floating point numbers

The number of decimal digits after the decimal is not fixed (i.e. the decimal point “floats”)

• 13131.3 – one digit after decimal point
• 0.0124 – four digits after decimal point
• 3.14 – two digits after decimal point

Floating point numbers can be represented in exponent form

• 0.31415e+1  (= 0.31415*10^1 = 3.1415)
• 31.415e-1  (= 31.415*10^-1 = 3.1415)
Floating point data types

• float
  – Storage size: 32-bit (4 mailboxes)
  – Range: \(-(10^{38})\) to \(10^{38}\)
    • Negative range: \(-3.4e+38\) to \(-1.4e-45\)
    • Positive range: \(1.4e-45\) to \(3.4e+38\)

• double
  – Storage size: 64-bit (8 mailboxes)
  – Range: \(-10^{308}\) to \(10^{038}\)
    • Negative range: \(-1.7e+308\) to \(-4.9e-324\)
    • Positive range: \(4.9e-324\) to \(1.7e+308\)

For details on floating point encoding method, take CS 255
Floating point operators

• Parentheses (…)
• Negation – Unary operator
• Multiplication * Binary operator
• Division / Binary operator
• Addition + Binary operator
• Subtraction – Binary operator
• Exponent operators Math.pow(a, b)
Demo with AreaOfCircle.java

• See classcode resources for today’s lecture
Integer data types

• int
  – Storage size: 32-bit (4 mailboxes)
  – Range: \(-2^{31}\) to \(2^{31}\)

• long
  – Storage size: 64-bit (8 mailboxes)
  – Range: \(-2^{63}\) to \(2^{63}\)

Less frequently, you may want to use…

• byte (8-bit)
• short (16-bit)
Floating point operators

- Parentheses (…)
- Negation – Unary operator
- Multiplication * Binary operator
- Division / Binary operator
- Remainder % Binary operator
- Addition + Binary operator
- Subtraction – Binary operator
Demo with DisplayTime.java

• See classcode resources for today’s lecture