Chapter 3: Variables and Arithmetic

- Numeric (primitive) data types
  - declaring
  - precision
  - assignment
    * literal constants
      - shortcut casting (using d, l and f)
      - scientific notation
    * cascading assignments
    * memory diagrams
    * contrast with object assignments
      - copying a primitive type variable (e.g. x = y) copies the value of the right-hand variable into the left-hand variable (overwriting whatever was in the left-hand variable to begin with); copying an object variable
makes the left-hand variable point to the *same* object as the right-hand variable — the object itself is not copied.

* losing and gaining precision
  * losing precision causes compiler error (unless casting is used)
  * gaining precision is OK

- Arithmetic
  - +, − (unary and binary), *, /, %, ()
  - order of operations (precedence)
  - examples (p. 97)
    1. 3 + 5/7
    2. 3 * 3 + 3%2
    3. 3 + 2/5 + −2 * 4
    4. 2 * (1 + −(3/4)/2) * (2 − 6%3)
5. \( (3 + 5)/7 \)
6. \( (3 + 5)/(\text{float})7 \)
7. \( (\text{float})((3 + 5)/7) \)
8. how do we write \( \frac{-b(c+34)}{2a} \)?

- The JDK Math class
  - example of a library class
  - no need to instantiate or import
  - contains useful math functions:
    * \( \log(\text{double}) \)
    * \( \text{pow}(\text{double, double}) \)
    * \( \text{abs}(\text{int}), \text{abs}(\text{long}), \text{abs}(\text{float}), \text{abs}(\text{double}) \)
    * \( \text{sqrt}(\text{double}) \)
    * \( \text{sin}(\text{double}), \text{cos}(\text{double}), \text{tan}(\text{double}) \)
  - how do we write \( \frac{-b\pm\sqrt{b^2-4ac}}{2a} \)?
More Javabook Classes

- **InputBox**
  - constructor takes “parent” `MainWindow` object
  - `getXXX()` and `getXXX(String)` methods
    * `XXX = Double, Float, Integer, String`
    * optional argument is prompt `String`
  - pops up window (with optional prompt), and waits for use to enter an appropriate piece of data

- **OutputBox**
  - constructor takes “parent” `MainWindow` object
  - `print(<type>)` and `printLine(<type>)` methods
    * `<type> = boolean, char, double, long, String`
  - `skipLine(int)` method
  - the ‘\n’ character causes text to move to start of next line