• Questions
• Announcements
• Names

Exercise: Guessing

• With team, write pseudocode for guessing a number between 1 and 100. Be prepared why your approach the best way to solve the problem.
Example: Multiplication

How would you multiply two numbers, using only the addition operator?

Concepts: iterations, efficiency

Algorithms are used to express solutions to computational problems.

• An algorithm is a precise sequence of instructions for a process that can be executed by a computer.
  – Sequencing, selection, iteration, and recursion are building blocks.
  – Different algorithms can be developed to solve the same problem.

• Algorithms are expressed and implemented using languages.
  – natural language, pseudo-code, and visual and textual languages.
  – better suited for expressing different algorithms.
  – can affect clarity or readability, but not whether solution exists.

• Algorithms can solve many, but not all, problems.
  – Many problems can be solved in a reasonable time.
  – Some need heuristic approaches to solve them in a reasonable time.
  – Some problems cannot be solved using any algorithm.

• Algorithms are evaluated analytically and empirically.
  – using many criteria (e.g., efficiency, correctness, and clarity).
  – algorithms for the same problem can have different efficiencies.
Processing

- Language for programming graphical and interactive computations

```java
void setup() {
    size(480, 480);
}

void draw() {
    if (mousePressed) {
        fill(255, 0, 255);
    } else {
        fill(0, 255, 0);
    }
    rect(mouseX, mouseY, 50, 50);
}
```
Processing Exercise

• Break into groups of three (either within or across groups)
• Pick a computer; download Processing
• Complete tutorial 1
  – One person types; the other two advise
  – When complete, demonstrate to course staff
• Complete tutorial 2
  – Swap roles (scribe, advisors)
  – When complete, demonstrate to course staff
• Complete tutorial 3
  – Swap roles (scribe, advisors)
  – When complete, demonstrate to course staff

Programming enables problem solving, expression, and knowledge creation.

• Programs are written to execute algorithms.
  – Requires an understanding of how instructions are processed.
  – Programs are executed to automate processes.
  – A single program can be run multiple times and on many machines.
  – Executable programs increase the scale of problems that can be solved.
• Programming is facilitated by appropriate abstractions.
  – Functions are re-usable programming abstractions.
  – Parameterization can be used to generalize a specific solution.
  – Data abstraction can separate behavior from implementation.
  – APIs and libraries simplify complex programming tasks.
• Programs are developed and used by people.
  – Developing programs is an iterative process.
  – Finding and eliminating errors is an essential part.
  – Documentation is necessary for developing maintainable programs.
  – Programs are evaluated for their correctness and style.
Assignment 3: Processing

• Implement a program to help a user plan a garden, given
  – Layout shape
  – Plant type
  – Number of plants

• Appropriate collaboration: discuss, but write your own code