More Loops

Sep 27

for, nested loops
While loops

• Common thing to do with loops is
  • initialize a variable
  • Repeat
    • Check to make sure the variable is OK
    • Do something interesting
    • Change the variable

• This is so common there is another loop to do much of this in one line

compute sum_{i=0..10}(2^i)
"For" loop

for (INIT ; CONDITION ; UPDATE) {
  BODY
}

For-loops are preferred when you have the init/condition/body/update pattern, and/or when you know how many times you want the thing to run

compute sum_{i=0..10}(2^i)

Compute the nth Fibonacci number
Questions

for (int i = 0; i < 3; i++) {
    System.out.println("hi");
}

How many times is "hi" printed?

for (int i = 0; i < 3; i++) {
    int j=0;
    j = j+i;
    System.out.println(j);
}

What is printed?

int x = 1;
for (int i = 3; i <= 6; i++) {
    x *= i; // this is shorthand for x = x*i
}

What is the final value of x?

Does this even compile? If not, fix!
Compute the average of 1000 randomly drawn numbers from the range 0..1.0

Write twice:
- while loop
- for loop

What do you expect to be the answer?

Recall to get a random number in the range 0..<1.0

double rDoub = Math.random();
Loops in loops

- Question: is the random number generator really good?
  - One answer, do not just compute the sum of 1000
    - Instead, compute the sum of 1000, 1000 times!
    - If random is good, then all 1000 should be similar.
  - How??
    - Loop within a loop
Prime Numbers

• First, is a number prime?
• The find all primes less than 100?
  • This will require nested loops!
Lots of Loops

Things to worry about

• What changes in each loop
• How does the inner loop depend on the outer loop
• How is the work done in the inner loop affected by the outer loop
  • Resetting variables