Using a Count Variable

Developing For-Loop Solutions

Nested Loops

L6. More on Iteration

A Year-Printing Fragment

First = input('Enter first year');
Last = input('Enter last year');
for y = First:Last
    fprintf('%5d
',y)
end

Suppose First is 1999 and Last is 2001.

1999
First

2001
Last

y

How It Works

We enter the for-loop and y is initialized

1999
First

2001
Last

1999
y

How It Works

Is the value in y <= than the value in Last?

1999
First

2001
Last

1999
y

How It Works

Yes. Execute the loop body and increment y.

1999
First

2001
Last

2000
y

Output

1999
How It Works

for y = First:Last
    fprintf('%5d\n',y)
end

Is the value in y <= the value in Last?

Yes. Execute the loop body and increment y.

for y = First:Last
    fprintf('%5d\n',y)
end

Is the value in y <= the value in Last?

Yes. Execute the loop body and increment y.

for y = First:Last
    fprintf('%5d\n',y)
end

Is the value in y <= the value in Last?

No. The loop is finished.
Problem Solving With the For-Loop

for count variable = expression for starting value : expression for ending value
end

The calculation to be repeated.

Developing For-Loop Solutions

Illustrate the thinking associated with the design of for-loops

The methodology of stepwise refinement.

An example.

A Game: TriStick

Pick three sticks each having a random length between zero and one.

You win if you can form a triangle whose sides are the sticks. Otherwise you lose.

Win:

Lose:

Problem

Estimate the probability of winning a game of TriStick by simulating a million games and counting the number of wins.

Pseudocode

Initialize running sum variable.
Repeat 1,000,000 times:
Play a game of TriStick by picking the three sticks.
If you win increment the running sum
Estimate the probability of winning
Refine...

% Initialize running sum variable.
wins = 0;
for n = 1:1000000
    % Play the nth game of TriStick by picking the three sticks.
    if (a<b+c) && (b<a+c) && (c<a+b)
        % No stick is longer than the sum of the other two.
        wins = wins+1;
    end
end
% Estimate the prob of winning
p = wins/1000000

Refine the Loop Body

% Play the nth game of TriStick by picking the three sticks.
if you win
    increment the running sum.
end

Refine the Loop Body

% Play the nth game of TriStick by picking the three sticks.
a = rand; b = rand; c = rand;
if (a<b+c) && (b<a+c) && (c<a+b)
    % No stick is longer than the sum of the other two.
    wins = wins+1;
end

Key Problem-Solving Strategy

Progress from pseudocode to Matlab through a sequence of refinements.

Comments have an essential role during the transitions. They "stay on" all the way to the finished fragment.