Lecture 04
Arrays, For Loop, Nested Loops

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July 3, 2013
Before we begin

HW1 Questions
OH Thursday, Friday
Arrays

Array
A variable to hold multiple values of the same type.

Example

```javascript
x = [1, 2, 3, 4, 5, 6, 7];
y = ['a', 'b', 'c'];
z = 'abc';
```
Arrays - Indexing

Indexing
Specifying an element of an array by providing its location.

Example

```plaintext
a = [2, 3, 5, 7, 11, 13];
a(1) % 2
a(2) % 3
a(3) % 5
a(6) % 13

s = 'Cornell'
s(1) % 'C'
s(4) % 'n'
```
Operations with Arrays

Array operators

\(^{\wedge}\) elementwise power raising
\(^{\ast}\) elementwise multiplication
\(^{/}\) elementwise division

Example

\[
\begin{align*}
    a &= [2 \ 3 \ 4 \ 5]; \\
    b &= [1 \ 2 \ 4 \ 3]; \\
    c &= a \times b; \ % \ c \ is \ [2 \ 6 \ 16 \ 15] \\
    d &= a \times^{\wedge}b; \ % \ d \ is \ [2 \ 9 \ 256 \ 125] \\
    e &= a \div b; \ % \ e \ is \ [2 \ 1.5 \ 1 \ 1.6667] \\
    f &= a + b; \ % \ f \ is \ [3 \ 5 \ 8 \ 8]
\end{align*}
\]
Colon (:) Notation

Colon (:
creates a sequence of numbers with constants steps

Example

```
1:6
% [1 2 3 4 5 6]
1:2:6
% [1 3 5]
6:-2:1
% [6 4 2]
'a':'e'
% 'abcde'
'e':2:'k'
% 'egik'
```
Parts of an array can be extracted by indexing with colon notation.

**Example**

```plaintext
a = [2, 3, 5, 7, 11, 13];
a(1:2)    % [2, 3]
a(1:2:5)  % [2, 5, 11]
a(6:-3:1) % [13, 5]
a(1:3:end) % [2, 7]
a(2:end-1) % [3, 5, 7, 11]
```
for
iterates over a range of values

Usage

```plaintext
for  %<variable> = <range>
  %<loop body>
end
```
for - Examples

Example

% This will display values of x
% at every iteration from 1 to 5
for x = 1:5
    x
end
for - Examples

Example

% Sum integers from 1 to 100
s = 0;
for j = 1:100
    s = s + j;
end
fprintf('1+..+100=%d\n',s);
Nested Loops

Nested loops are loops within loops

Example

```
for %<var1> = <range1>
    for %<var2> = <range2>
        % ....
    end
end
```
More Nested

Example

while \texttt{condition1}

\hspace{1cm}

while \texttt{condition2}

\hspace{1cm}

end

end

end