Before we begin

- **QZ2**  Online Quiz 2 Solutions
- **HW1**  Grades on CMS
- **HW3**  Due: July 16, 10am
- **CC**  Course Calendar Updated
- **PP**  Project proposals
Too many possibilities

Handling with if/elseif/else/end

```matlab
n = input('enter a digit: ');
if n == 1
    disp('one');
elseif n == 2
    disp('two');
elseif n == 3
    disp('three');
elseif n == 4
    disp('four');
else
    disp('something else');
end
```

% and many more
Switch/Case

switch
branches based on several cases

Usage

```plaintext
switch switch_expr
  case case_expr1
    do_something1
  case case_expr2
    do_something2
  case {case_expr3, case_expr4}
    do_something3
  otherwise
    do_some_other_thing
end
```
n = input('enter a digit: ');
switch n
    case 1
        disp('one');
    case 2
        disp('two');
    case 3
        disp('three');
    case 4
        disp('four');
% and many more
    otherwise
        disp('something else');
end
Switch/Case - Examples

```matlab
hall = 'Morrill';

switch hall
    case {'Morrill','Goldwin Smith'}
        disp('Arts Quad');
    case {'Warren','Roberts'}
        disp('Ag Quad');
    case {'Upson','Duffield','Kimball'}
        disp('Engineering Quad');
    otherwise
        disp('Unknown Hall');
end
```
2D Arrays (Matrices)

2D Array
holds multiple values indexed with two numbers.

Example

a = [ 1, 2, 3, 4;
     5, 6, 7, 8;
     9, 10, 11, 12 ];
Matrices - Comma vs. Semicolon

**comma**, 
seperates the columns

**semicolon ;** 
seperates the rows

**Example**

```plaintext
a = [1, 2; 3, 4];
b = [1 2
     3 4];
c = [1, 2, ... % ??
     3, 4];
d = [1; 2;
     3; 4];
```
Indexing

Specifying an element of an array by providing its location.

Example

\[
a = \begin{bmatrix}
1 & 2 & 3 & 4 \\
5 & 6 & 7 & 8 \\
9 & 10 & 11 & 12
\end{bmatrix};
\]

% variable(row_index, column_index)
a(1,1) % 1
a(2,1) % 5
a(1,2) % 2
a(2,3) % 7
a(3,2) % 10
Example

```matlab
a = [ 1, 2, 3, 4;
     5, 6, 7, 8;
     9, 10, 11, 12 ];

% Sum the entries of the matrix
s = 0;
for j = 1:3
    for k = 1:4
        s = s + a(j,k);
    end
end
```
Matrices - Size, Some Generators

size
returns an array with the number rows and columns

ones(m,n), zeros(m,n)
generates all 1’s or all 0’s

rand(m,n)
generates random numbers between 0 and 1
Using a 2D Array

In the last page of the Hw2 Solutions, we discuss whether we need to repeat similar loops for $p$ and $q$. And the last solution provided contains two dimensional arrays and `find` function, which we are more familiar now. On the next slide you can find a similar script which creates a two dimensional arrays, and fills the entries such that value at $(i, j)$ is $i^3 + j^3$. Try to understand how this script works. Learn to use MATLAB help when you need. The script correctly finds 1729 and more, but how would you keep track of the values for $x$, $y$, $p$, $q$. You can use this script in Hw3 after some modification.
Taxicab(2) - Using 2D Arrays

```matlab
n = 20; S = zeros(n);
for x = 1:n;
    for y = 1:n;
        S(x,y) = x^3 + y^3;
    end
end
values = [];
for x = 1:n
    values = [values, S(x,x+1:end)];
end
for j = unique(values)
    if length(find(values == j)) == 2
        fprintf('Taxicab(2) number %d\n',j);
    end
end
```