Lecture 03
Branches, Loops

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Before we begin

QZ1  In-class quiz graded
QZ1  Online quiz @ NetID email
HW1  Solutions are online
    OH  Office hours time & location
    TB  Readings from textbook
if-else-end

Based on conditions different code fragments are executed

Usage

```plaintext
if %<condition>
  %<statements executed when % the condition is TRUE>
else
  %<statements executed when % the condition is FALSE>
end
```
More Conditions

Usage

```plaintext
if %<condition1>
  %<statements executed when % condition1 is TRUE>
else
  if %<condition2>
    %<statements executed when % condition1 is FALSE and % condition2 is TRUE>
  else
    %<statements executed when % condition1 is FALSE and % condition2 is FALSE>
  end
end
```
### Usage

```plaintext
if %<condition1>
    %<statements executed when % the condition1 is TRUE>
elseif %<condition2>
    %<statements executed when % the condition1 is FALSE % and condition2 is TRUE>
else
    %<statements executed when % the condition1 is FALSE % and condition2 is FALSE>
end
```
While Loop

while
  the condition is true, keep executing the same code block

Usage

while %<condition>
  %<this code block will be executed
  % while the condition is true, until
  % it turns into false>
end
What is the sum of numbers from 1 to $n$?

$$\text{sum} = 1 + 2 + \ldots + n = \frac{n(n+1)}{2}$$

Let’s sum these numbers using while-loop
1 + ... + n

sum_numbers.m

n = input('enter n: '); % Get the maximum number

j = 1; s = 0; % Initialize counter and sum variables

if n >= 1
    while j <= n
        s = s + j;
        j = j + 1;
    end
else
    error('n should be positive');
end

fprintf('The sum is %d \n', s);
Is it a prime number?

Prime number
A positive integer that has no positive divisor other than 1 and itself. If $x$ is prime and $x = a \times b$, where $a, b$ are positive integers, $a$ and $b$ have to be either 1 or $x$.

Fact
If $x$ is not a prime, it should have a divisor less than or equal to $\sqrt{x}$ and greater than 1. (Why?)

isprime
Let’s write a function to check if a number is prime or not.
isprime function

isprime.m

function p = isprime(n)
% Returns true if n is prime, otherwise returns false.
% Assumes n is a positive integer.

if n == 1, p = false; return; end

m = floor(sqrt(n));

j = 2; p = true;

while j <= m
    if rem(n,j) == 0, p = false; end
    j = j + 1;
end
Number Guessing - Revisited

numbergame.m

```matlab
number = fix(10*rand);
guess = -1;

while guess ~= number
    guess = input('enter a digit: ');
    if number == guess
        disp('that is my number!');
    else
        if number > guess
            disp('my number is greater');
        else
            disp('my number is smaller');
        end
    end
end
```