Topics: Branching (cont'd), MATLAB built-in functions, introduction to iteration

Branching

Example: Bacteria B reproduces only when the temperature is above 12°C. The rate is a function of the temperature t in °C: $(t-12)^2$ per hour. *When the temperature drops below 0° C, the bacteria die at a rate of 10 per hour.* Calculate the rate at which bacteria B increases given some temperature entered in °F.

```
% Convert temperature from F to C
  tempF = 60;
  tempC = (tempF-32)*5/9;

% Calculate rate
  tRep = 12;  % Temperature above which bacteria reproduce




  if (tempC>tRep)
     rate = (tempC-tRep)^2;




  else
     rate = 0;
  end
```

MATLAB Built-in Functions... Fun with MATLAB

MATLAB provides numerous built-in variables and functions. Below is a collection of commands that can be typed in the command window to illustrate some of the built-in features:

```
% This is a comment

% Variables, constants, and simple calculations:
  a = 100
  b = 99
  format compact
  a/b
  ans
  y = ans
  format long
  y
  format short
  y
  (3*2)^2
  (3*2)^2;
  x = 2;  y = x^x;  z = y^y
  format loose

% Functions:
  sqrt(x)
  pi  % a built-in variable
  cos(pi)
  abs(ans)
  abs(cos(pi))
  exp(ans)
  rand(1)
  help exp
  lookfor exponential
```

Iteration

How do I get from the front of the classroom to the back?

Important features:

- Task can be accomplished if some step is repeated a number of times
- Must be able to quantify success ⇒ _____
- Must have a starting point
- Must keep track of progress ⇒ _____

Important features of **iteration**

- some step is repeated to accomplish task
- quantify success
- know starting point
- keep track of progress

The `while` loop

`while` *expression*

statements to execute if expression evaluates to true

`end`

The `while` loop

initialization

`while` *not stopping signal*

    do something
    update status (e.g., counter)

`end`