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
  tDie = 0;   % Temperature below which bacteria reproduce
  rateDie = -10;  % Rate at which bacteria die off
  if (tempC>tRep)
     rate = (tempC-tRep)^2;
  elseif (tempC<tDie)
     rate = rateDie;
  else
     rate = 0;
  end
  rate
```

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 $\Rightarrow$ _____

- Must have a starting point

- Must keep track of progress $\Rightarrow$ _____