

File: trap_mf.m

```
function mf = trap_mf(x, abcd)
% Trap MF using equation from page 25 of Jang Book
%
% File: trap_mf.m
% This function calculates the trapazoid function.
%   Larry Bush December 4, 2001
%   email: bushl2@rpi.edu
%   Student ID: 660 220 742

% Project   : Fuzzy Logic Controler for the Inverted Pendulum Problem
% Soft Computing
% Instructors: Kai Goebel / Bill Cheetham

    a = abcd(1);
    b = abcd(2);
    c = abcd(3);
    d = abcd(4);

    if a > b,
        error('Illegal parameters: a > b');
    elseif b > c,
        error('Illegal parameters: b > c');
    elseif c > d,
        error('Illegal parameters: c > d');
    end
    % calc left side
    left = (x-a)/(b-a);
    % calc right side
    right = (d-x)/(d-c);
    % set middle
    middle = 1;

    % This part is done in two steps because
    % MIN with two matrices to compare and a working dimension is not supported.
    %
    % make triangle by taking min of left and right
    triangle = min(left, right);
    % chop of the top of the triangle
    trapazoid = min(triangle, middle);

    % this last step makes everything outside the trapazoid
    % which would be less than zero, equal to zero.
    mf = max(trapazoid, 0);
```