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function [p] = pressureCal(g, R, T, T1, h, h1, Th, unit)
```

FUNCTION DESCRIPTION: This function is designed to calculate the pressure at a where the temperature is constant in a specific altitude, such as: tropopause, stratopause, mesopause, etc.

This function is from HW #1

OUTPUT VARIABLES:

p: The pressure at an altitude h (Pa)

INPUT VARIABLES:

g: Gravitational acceleration [SI or English untis]

R: Gas Constant specific to planet [SI or English units]

T: Vector of temperatures at a certain altitude [K]

T1: Vector of average temperature at the average surface level or initial temperature [K]

h: Vector of the specific altitude [m] or [ft]

h1: Vector of the average surface level or initial surface level [m] or [ft]

Th: Vector of temperatures lapse rate

unit: String indicating English or SI units

MAIN (CODE)

```
sz = size(h);
p = zeros(sz);

if unit == "SI"
    p1 = 1013.2*100; % Initial pressure at surface (Pa)
else
    p1 = 2116.12;    % initial presure at surface (lb/ft^2)
end

ct = 0;          % counter

for i = 1:1:length(h)
    if h(i) <= h1(2)
        if ct == 0
            ct = ct + 1;
        end

        p(i) = p1 * (T(i) / T1(1))^(-g / R / Th(1));
    elseif (h1(2) < h(i)) && (h(i) <= h1(3))
        if ct == 1
            p1 = p(i-1);
            ct = ct + 1;
        end

        p(i) = p1 * exp(-g * (h(i) - h1(2)) / R / T(i));
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    elseif (h1(3) < h(i)) && (h(i) <= h1(4))
       if ct == 2
            p1 = p(i-1);
            ct = ct + 1;
        end

        p(i) = p1 * (T(i) / T1(2))^(-g / R / Th(2));
    elseif (h1(4) < h(i)) && (h(i) <= h1(5))
        if ct == 3
            p1 = p(i-1);
            ct = ct + 1;
        end

        p(i) = p1 * exp(-g * (h(i) - h1(4)) / R / T(i));
    elseif (h1(5) < h(i)) && (h(i) <= h1(6))
       if ct == 4
            p1 = p(i-1);
            ct = ct + 1;
        end

        p(i) = p1 * (T(i) / T1(3))^(-g / R / Th(3));
    elseif (h1(6) < h(i)) && (h(i) <= h1(7))
       if ct == 5
            p1 = p(i-1);
            ct = ct + 1;
        end

        p(i) = p1 * exp((-1)* g * (h(i) - h1(6)) / R / T(i));
    elseif (h1(7) < h(i)) && (h(i) <= h1(8))
       if ct == 6
            p1 = p(i-1);
            ct = ct + 1;
        end

        p(i) = p1 * (T(i) / T1(4))^(-g / R / Th(4));
    end
end
```