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```
function [minlength] = PS08_fin_length_rbehl(diameter,Tb,Tamb,k)

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% ENGR 132
% Program Description
% The function takes in four user input for diameter, thermal
% conductivity
% constant, Temperature from source and the ambient air temperature to
% find
% the minimum length required to use the infinte fin model.
%
% Function Call
%[minlength] = PS08_fin_length_rbehl(diameter,T,Tb,k)
%
% Input Arguments
% diameter is the rod's diameter
% k is the metal's thermal conductivity
% Tb is the heart source temperature
% Tamb is the ambient air temperature
% Output Arguments
% minlength is the minimum length required to use the infinte fin
% model
%
% Assignment Information
% Assignment:          PS 08, Problem 02
% Author:              Ranjan Behl, rbehl@purdue.edu
% Team ID:             008-14
% Contributor:  Name, login@purdue [repeat for each]
% My contributor(s) helped me:
%   [ ] understand the assignment expectations without
%       telling me how they will approach it.
%   [ ] understand different ways to think about a solution
%       without helping me plan my solution.
%   [ ] think through the meaning of a specific error or
%       bug present in my code without looking at my code.
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

---

## INITIALIZATION

```
T = Tb; % setting the intital temperture
h = 100; % heat coeffiecent( W/ m^2K)
minlength = 0.01; % initial distance
m = sqrt(h * 2 * pi *(diameter / 2) / (k * pi *(diameter / 2)^2)); %
    the constant associated with the rod
```

---

## CALCULATIONS

if else statements to check if the inputs are valid, and if they are vaild using the inputs the find the min length.

```
if (diameter < 0 || k < 0 || Tb < 0 || Tamb < 0)
    fprintf("\nOne of the inputs is invalid");
    minlength = -1;
    fprintf("\nThe minimum length required to use the infinte fin
model is %f",minlength);
else
    while round(T) > Tamb
        T = Tamb + (Tb - Tamb) * exp(-m * minlength);
        minlength = minlength + 0.01;
    end
    minlength = minlength * 100 - 1;
    fprintf("\nThe minimum length required to use the infinte fin model is
    %0.0f",minlength);
end
```

*The minimum length required to use the infinte fin model is 8*

---

## COMMAND WINDOW OUTPUT

Copper, k = 400

```
%{
PS08_fin_length_rbehl(0.005,373,298,400)

The minimum length required to use the infinte fin model is 36
ans =

    36.0000
%}
```

---

```
% aluminium, k = 205
%{
PS08_fin_length_rbehl(0.005,373,298,205)

The minimum length required to use the infinte fin model is 26
ans =

    26.0000
%}
```

---

## ACADEMIC INTEGRITY STATEMENT

```
PS07_integrity_rbehl("Ranjan Behl");
```

*I am submitting code that is my own original work. I have not used source code, either modified or unmodified, obtained from any unauthorized source. Neither have I provided access to my code to any peer or unauthorized source. Signed,*  
*<Ranjan Behl>*

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