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```
function [Reynolds_num] =
 PS09_reynolds_thuter_hkolagan(flu_density,flu_velocity,pipe_diameter,flu_viscosit

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% ENGR 132
% Program Description
%   Takes the fluid density, velocity, viscosity and pip diameter and
%   calculates the reynolds number of the system as well as what flow
 type
%   the system has.
%
% Function Call
%
 PS09_reynolds_thuter_hkolagan(flu_density,flu_velocity,pipe_diameter,flu_viscosit
%   (Note: The inputs should all be numeric values.)
%
% Input Arguments
%   1. flu_density
%   2. flu_velocity
%   3. pipe_diameter
%   4. flu_viscosity
% Output Arguments
%   1. Reynolds_num
%
% Assigment Information
%   Assignment:       PS 09, Problem 1
%   Author:             Tyler Huter, thuter@purdue.edu
%   Team ID:            005-12
%   Paired Programmer:  Harith Kolaganti, hkolagan@purdue.edu
%   Contributor:        Name, login@purdue [repeat for each]
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

INITIALIZATION

```
%Valid set of values for published file.
flu_density = .5
flu_velocity = 5
pipe_diameter = .07
flu_viscosity = 3

%Creates a range of values for fluid density, and designates an error
%message for any values outside of that range.
if flu_density < 0.5 | flu_density > 1500
    error('invalid density')
end

%Creates a range of values for fluid velocity, and designates an error
%message for any values outside of that range.
if flu_velocity < 0 | flu_velocity > 10
    error('invalid velocity')
end

%Creates a range of values for pipe diameter, and designates an error
%message for any values outside of that range.
if pipe_diameter < 0.05 | pipe_diameter > 0.2
    error('invalid diameter')
end

%Creates a range of values for fluid viscosity, and designates an
 error
%message for any values outside of that range.
if flu_viscosity < .001 | flu_viscosity > 25
    error('invalid viscosity')
end


flu_density =

    0.5000


flu_velocity =

     5


pipe_diameter =

    0.0700


flu_viscosity =
```

3

CALCULATIONS

```
Reynolds_num = flu_density*flu_velocity*pipe_diameter/flu_viscosity;
%calculates the value of the Reynold's number of the system given a
 set of
%values.
```

FORMATTED TEXT DISPLAYS

```
%Prints the values of all of the variables utilized in the program.
%(Including the Reynold's number.)
fprintf('The value for fluid density is, %.3f\n', flu_density);
fprintf('The value for fluid velocity is, %.3f\n', flu_velocity);
fprintf('The value for pipe diameter is, %.3f\n', pipe_diameter);
fprintf('The value for fluid viscosity is, %.3f\n', flu_viscosity);
fprintf('The value of the Reynolds Number is, %.3f\n', Reynolds_num);
```

```
The value for fluid density is, 0.500
The value for fluid velocity is, 5.000
The value for pipe diameter is, 0.070
The value for fluid viscosity is, 3.000
The value of the Reynolds Number is, 0.058
```

COMMAND WINDOW OUTPUTS

```
%Designates what ranges of the Reynold's number are associated with
 which
%flow types.
if Reynolds_num < 2300
    fprintf('Flow Type: laminar\n');
elseif Reynolds_num > 4800
        fprintf('Flow Type: turbulent\n');
else
        fprintf('Flow Type: transitional\n');
end

%PS09_reynolds_thuter_hkolagan(.5,11,.01,1)
%Invalid velocity
%PS09_reynolds_thuter_hkolagan(.5,1,.03,1)
```

```
%Invalid diameter
%PS09_reynolds_thuter_hkolagan(.5,1,.01,26)
%Invalid viscosity
%PS09_reynolds_thuter_hkolagan(.5,1,.05,25)
%Flow type: laminar
%PS09_reynolds_thuter_hkolagan(1500,10,.2,.001)
%Flow type: turbulent
%PS09_reynolds_thuter_hkolagan(75,5,.07,.01)
%Flow type: transitional
```

```
Flow Type: laminar

ans =

    0.0583
```

ACADEMIC INTEGRITY STATEMENT

I/We have not used source code obtained from any other unauthorized source, either modified or unmodified. Neither have I/we provided access to my/our code to another. The project I/we am/are submitting is my/our own original work.

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