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```
function [approx_ln3, abs_diff] = PS09_ln3_noloop_koike(num_terms)
```

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% ENGR 132
% Program Description
% This program calculates the estimate of ln3 and the absolute
% difference with the matlab calculated ln3 the without using a
% loop command
%
% Function Call
% [estimate, abs_diff] = PS09_ln3_noloop_koike(num_terms);
%
% Input Arguments
% 1. num_terms: the number of terms for the approximate summation
%
% Output Arguments
% 1. estimate: the approximate value of ln3
% 2. abs_diff: the absolute difference between the approximate and the
% matlab calculated value for ln3.
%
% Assignment Information
%   Assignment:      PS 09, Problem 2
%   Author:          Tomoki Koike, koike@purdue.edu
%   Team ID:         002-08
%   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

```
% initialization of output
approx_ln3 = -99;
abs_diff = -99;
```

CALCULATIONS

```
% start
if round(num_terms) - num_terms == 1 || num_terms<0
    fprintf('Error, invalid n\n');
else
    % the index for the summation
    index = 0:1:(num_terms-1);
    cal_ln3 = sum(1 ./ 4.^(index) .* (1 ./ (2*(index)+1)));
    approx_ln3 = cal_ln3;
    abs_diff = abs(log(3)-approx_ln3);
    fprintf('the approximate value of ln3 is %f and the absolute
difference is %f', approx_ln3, abs_diff);
end

the approximate value of ln3 is 1.098611 and the absolute difference
is 0.000001
```

COMMAND WINDOW OUTPUT

```
% test case 1 <n=8>
% num_terms = 8;
% [estimate, abs_diff] = PS09_ln3_noloop_koike(num_terms)
% The approximate value of ln3 is 1.098611 and the absolute difference
% is 0.000001
%
% estimate =
%
%     1.0986
%
%
% abs_diff =
%
%     1.1572e-06
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%
```

```

% test case 2 <n=8>
% num_terms = 12;
% [estimate, abs_diff] = PS09_ln3_noloop_koike(num_terms)
% the approximate value of ln3 is 1.098612 and the absolute difference
  is 0.000000
% estimate =
%
%      1.0986
%
%
% abs_diff =
%
%      3.1038e-09
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% test case 3 <n=24>
% num_terms = 24;
% [estimate, abs_diff] = PS09_ln3_noloop_koike(num_terms)
% the approximate value of ln3 is 1.098612 and the absolute difference
  is 0.000000
% estimate =
%
%      1.0986
%
%
% abs_diff =
%
%      6.6613e-16
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% test case 4 <n=-0.25>
% num_terms = -0.25;
% [estimate, abs_diff] = PS09_ln3_noloop_koike(num_terms)
% Error, invalid n
%
% estimate =
%
%      -99
%
%
% abs_diff =
%
%      -99

```

ACADEMIC INTEGRITY STATEMENT

```

% Call your academic integrity statement here
PS07_academic_integrity_koike("Tomoki Koike");

```

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,
<Tomoki Koike>*

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