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% ECE 6380 Homework 1.2
% Caitlyn Caggia

Rgamma = [ 4 0.4343 68.27;
           8 0.4156 62.59;
          16 0.4068 60.86;
          32 0.4043 60.40;
          64 0.4036 60.28];
Rgexact = [0.40338 60.245];
Rgest = cell(size(Rgamma,1)-1, size(Rgamma,2)+1);

Rtau = [ 4 0.9008 158.27;
         8 0.9096 152.59;
        16 0.9135 150.86;
        32 0.9147 150.40;
        64 0.9149 150.28];
Rtexact = [0.91503 150.245];
Rtest = cell(size(Rtau,1)-1, size(Rtau,2)+1);

for i = 1:size(Rgest,1)

    % Start new row
    Rgest{i,1} = [num2str(Rgamma(i,1)) '/' num2str(Rgamma(i+1,1))];
    Rtest{i,1} = [num2str(Rtau(i,1)) '/' num2str(Rtau(i+1,1))];

    % Extrapolate magnitude of gamma and tau
    Rgest{i,2} = (4*Rgamma(i+1,2) - Rgamma(i,2)) / 3;
    Rtest{i,2} = (4*Rtau(i+1,2) - Rtau(i,2)) / 3;

    % Extrapolate the angle of gamma and tau
    Rgest{i,3} = (4*Rgamma(i+1,3) - Rgamma(i,3)) / 3;
    Rtest{i,3} = (4*Rtau(i+1,3) - Rtau(i,3)) / 3;

    % Compute error for magnitude of gamma and tau
    Rgest{i,4} = abs(Rgexact(1)-Rgest{i,2})/Rgexact(1) * 100;
    Rtest{i,4} = abs(Rtexact(1)-Rtest{i,2})/Rtexact(1) * 100;

end

% Format table for extrapolated gamma values
Rgheaders = {'Number of Cells' '|gamma|' '<gamma' 'Error'};
Rg_table = [Rgheaders; Rgest];
Rg_table = [Rg_table; {'Exact' Rgexact(1) Rgexact(2) []}]

% Format table for extrapolated tau values
Rtheaders = {'Number of Cells' '|tau|' '<tau' 'Error'};
Rt_table = [Rtheaders; Rtest];
Rt_table = [Rt_table; {'Exact' Rtexact(1) Rtexact(2) []}]

Rg_table =

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6×4 cell array

{'Number of Cells'}	{' /gamma/ '}	{' <gamma' }	{'Error' }
{'4/8' }	{[ 0.4094]}	{[60.6967]}	{[ 1.4841]}
{'8/16' }	{[ 0.4039]}	{[60.2833]}	{[ 0.1206]}
{'16/32' }	{[ 0.4035]}	{[60.2467]}	{[ 0.0215]}
{'32/64' }	{[ 0.4034]}	{[60.2400]}	{[ 0.0033]}
{'Exact' }	{[ 0.4034]}	{[60.2450]}	{0×0 double}

Rt\_table =

6×4 cell array

{'Number of Cells'}	{' /tau/ ' }	{' <tau' }	{'Error' }
{'4/8' }	{[0.9125]}	{[150.6967]}	{[ 0.2729]}
{'8/16' }	{[0.9148]}	{[150.2833]}	{[ 0.0251]}
{'16/32' }	{[0.9151]}	{[150.2467]}	{[ 0.0077]}
{'32/64' }	{[0.9150]}	{[150.2400]}	{[ 0.0069]}
{'Exact' }	{[0.9150]}	{[150.2450]}	{0×0 double}

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