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Lab9Simons.m

```
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```

```
clc; clear;
```

Problem 1

```
        Implement Gaussian elimination with partial pivoting to solve the
        following linear system:
         2x1        +  x3  -   x4 =  6
         6x1 + 3x2  + 2x3  -   x4 = 15
         4x1 + 3x2  - 2x3  +  3x4 =  3
        -2x1 - 6x2  + 2x3  - 14x4 = 12
```

```
% the number of equations / unknowns
n=4;

% the linear system represented by an augmented matrix
A = [ 2  0  1  -1  6; ...
      6  3  2  -1 15; ...
      4  3 -2   3  3; ...
     -2 -6  2 -14 12];

% use Gaussian elimination with partial pivoting to solve the linear
 system
x_approx = PartialPivoting(n, A);

% true solution
A = [ 2  0  1  -1; ...
      6  3  2  -1; ...
      4  3 -2   3; ...
     -2 -6  2 -14];

 b = [6; 15; 3; 12];

 x = A\b;

% print the results
fprintf('Approximation of x using Partial Pivoting\n');
for i=1:n
    fprintf('x(%d) = %f\n', i, x_approx(i));
    fprintf('error: %f\n\n', x(i) - x_approx(i));
```

```
end
```

Approximation of x using Partial Pivoting
x(1) = 2.000000
error: 0.000000

x(2) = -0.000000
error: -0.000000

x(3) = 1.000000
error: -0.000000

x(4) = -1.000000
error: 0.000000

Problem 2

```
        Implement Gaussian elimination with scaled partial pivoting to solve
        the following linear system:
         pix1 +pi2x2 -   x3 +    x4 = 0
         ex1 -    x2 +   x3 +   2x4 = 1
          x1 +    x2 -pi3x3 +    x4 = 2
         -x1 -    x2 +   x3 -pi5x4 = 3

% the number of equations / unknowns
n = 4;

% the linear system represented by an augmented matrix
A = [ pi     sqrt(2)       -1      1  0; ...
      exp(1)     -1         1       2  1; ...
      1           1   -sqrt(3)      1  2; ...
     -1          -1         1 -sqrt(5) 3];

% use Gaussian elimination with scaled partial pivoting to solve the
 linear
% system
x_approx = ScaledPartialPivoting(n, A);

% true solution
A = [ pi     sqrt(2)       -1      1; ...
      exp(1)     -1         1       2; ...
      1           1   -sqrt(3)      1; ...
     -1          -1         1 -sqrt(5)];

 b = [0; 1; 2; 3];

 x = A\b;


% print the results
fprintf('Approximation of x using Scaled Partial Pivoting\n');
for i=1:n
    fprintf('x(%d) = %f\n', i, x_approx(i));
```

```
    fprintf('error: %f\n\n', x(i) - x_approx(i));
end
```

```
Approximation of x using Scaled Partial Pivoting
x(1) = 1.349449
error: 0.000000

x(2) = -4.677988
error: 0.000000

x(3) = -4.032894
error: 0.000000

x(4) = -1.656638
error: 0.000000
```

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