

$$x_1 + x_2 - x_3 = -3$$

$$6x_1 + 2x_2 + 2x_3 = 2$$

$$-3x_1 + 4x_2 + x_3 = 1$$

% Part (a): Naive Gauss Elimination

A = [1, 1, -1;

6, 2, 2;

-3, 4, 1];

b = [-3; 2; 1];

Ab = [A, b];

n = size(A, 1);

x = zeros(n, 1);

% Forward Elimination

for k = 1:n-1

for i = k+1:n

factor = Ab(i, k) / Ab(k, k);

Ab(i, k:n+1) = Ab(i, k:n+1) - factor \* Ab(k, k:n+1);

end

end

% Backward Substitution

x(n) = Ab(n, n+1) / Ab(n, n);

```

for i = n-1:-1:1
    sum_val = 0;
    for j = i+1:n
        sum_val = sum_val + Ab(i, j) * x(j);
    end
    x(i) = (Ab(i, n+1) - sum_val) / Ab(i, i);
end

disp('Solution using Naive Gauss Elimination:');
disp(x);

% Part (b): Gauss Elimination with Partial Pivoting
A_pivot = [1, 1, -1;
           6, 2, 2;
           -3, 4, 1];

b_pivot = [-3; 2; 1];

Ab_pivot = [A_pivot, b_pivot];

n = size(A_pivot, 1);
x_pivot = zeros(n, 1);

% Forward Elimination with Partial Pivoting
for k = 1:n-1
    [~, max_idx] = max(abs(Ab_pivot(k:n, k)));

```

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pivot_row = k + max_idx - 1;

temp_row = Ab_pivot(k, :);
Ab_pivot(k, :) = Ab_pivot(pivot_row, :);
Ab_pivot(pivot_row, :) = temp_row;

for i = k+1:n
    factor = Ab_pivot(i, k) / Ab_pivot(k, k);
    Ab_pivot(i, k:n+1) = Ab_pivot(i, k:n+1) - factor * Ab_pivot(k, k:n+1);
end
end

% Backward Substitution
x_pivot(n) = Ab_pivot(n, n+1) / Ab_pivot(n, n);
for i = n-1:-1:1
    sum_val = 0;
    for j = i+1:n
        sum_val = sum_val + Ab_pivot(i, j) * x_pivot(j);
    end
    x_pivot(i) = (Ab_pivot(i, n+1) - sum_val) / Ab_pivot(i, i);
end

disp('Solution using Gauss Elimination with Partial Pivoting:');
disp(x_pivot);

```