```
function [x, U] = Chap2_CalculateModelFemSolution(N)

% Initialise A and b to zero
A = zeros(N+1, N+1);
b = zeros(N+1, 1);

% Generate N+1 nodes, equally spaced between 0 and 1
x = linspace(0, 1, N+1);

% Loop over elements calculating local contributions
% and incrementing to the global linear system
for k=1:N
    % Calculate element length
    h = 1/N;

    % Calculate local contributions
    A_local = [1/h, -1/h; -1/h, 1/h];
    b_local = [h; h];

    % Increment global system
    A(k:k+1, k:k+1) = A(k:k+1, k:k+1) + A_local;
    b(k:k+1) = b(k:k+1) + b_local;
end

% Set Dirichlet boundary conditions
A(1,:) = 0;
A(1,1) = 1;
b(1) = 0;
A(N+1,:) = 0;
A(N+1,N+1) = 1;
b(N+1) = 0;

% Solve linear system and plot FE solution
U = A\b;

% Plot finite element solution
plot(x, U, '-o')
xlabel('x')
ylabel('U')
```