```
A = [1 1 1 1 1;-1 -0.5 0 0.5 1;1 0.25 0 0.25 1]';
b = [1 0.5 0 0.5 2]';
[n,m] = size(A);
R = eye(m);
Q = zeros(n,m);
x = norm(A(:,1));
Q(:,1) = A(:,1)./x;
R(1,1) = x;
for i = 2:m
    Q(:,i) = A(:,i);
    for j = 1:i-1
        R(j,i) = Q(:,j)'*A(:,i);
        Q(:,i) = Q(:,i) - R(j,i).*Q(:,j);
    end
    R(i,i) = norm(Q(:,i));
    Q(:,i) = Q(:,i)./R(i,i);
end
b_o = b;
b = Q'*b;
%back substitution
A1 = R(1:m,1:m);
x = zeros(m,1);
for i = m:-1:1
    a = 0;
    for j = m:-1:i
        a = a + A1(i,j)*x(j);
    end
    x(i) = (b(i)-a)/A1(i,i);
end
x;
least_square_error = sqrt(sum((A*x-b_o).^2));
```

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