test

Contents


```
%%HomeWork 5
% 15307130224
%

%%Part one is shown within the *.jpeg file
```

HouseHolder Function with test case

```
%function [Q, A] = household(A)
% [m, n] = size(A)
%
% Q = eye(m)
% for k = 1:n
%    x = A(k:m, k)
%
%    e = zeros(m-k+1, 1)
%    e(1,1) = 1

%    v_k = x + sign(x(1))*norm(x,2)*e
%    v_k = v_k/norm(v_k,2)
%
%    H = eye(m)
%    H(k:m,k:m) = eye(m-k+1) - 2*v_k*v_k'
%    A(k:m,k:n) = A(k:m,k:n) - 2*v_k*(v_k'*A(k:m,k:n));
%
%    Q = Q * H'
% end

%end
```

```
error_of_my_self = zeros(10,1);
error_of_standard = zeros(10,1);
for i = 1:10
  a = rand(500);
  [Q_self,R_self] = household(a);
  [Q_standard, R_standard] = qr(a);

  error_of_my_self(i) = norm((Q_self*R_self-a), 'fro');
  error_of_standard(i) = norm((Q_standard*R_standard-a),
      'fro');
end

mean_stand_error = mean(error_of_standard)
mean_self_error = mean(error_of_my_self)
```

```
mean_stand_error =     2.6490e-13
mean_self_error =     1.0212e-12
```

```
% We can use the least square mean error method to guess
    the paramter, to facilitate the
% process, we should use the QR decomposition and
    backward elimination.
%%Part3  Code
x_lines = linspace(0,1,30);
y_lines = zeros(30, 1);
A = zeros(30, 6);

for i = 1:30
  y_lines(i, 1) = cos(10*x_lines(i));
  for j = 1:6
    A(i,j) = x_lines(i)^(j-1);
  end
end

[Q, R] = household(A'*A);





lambdas = inv(R)*Q'*A'*y_lines

fit = zeros(30,1);
for i = 1:30
  for j = 1:6
    fit(i) = fit(i) + x_lines(i)^(j-1)*lambdas(j);
```

```
  end
end

plot(x_lines, fit, '-')
hold on
plot(x_lines, y_lines, '*')
```

```
lambdas =
      0.98176
      4.72657
   -136.94707
    500.65066
   -637.23132
    267.17512
```