**HW2 P4 Midterm**

**Code:**

%% Write a Matlab function to solve the weighted least-squares problem

% Spencer Freeman, 10/21/2024

% AOE 5784, Estimation and Filtering

%

% This script solves number 4 of problem set 2

% -------------------------------------------------------------------------

clear;clc;close all

disp('HW2-P4\_midterm')

z = [ -45.1800;...

1.7900;...

-31.3800;...

26.7700;...

27.6400] + .25;

H = [ -4.9300, -1.3100, -1.5900;...

13.2600, 9.7100, 30.7000;...

-17.0800, -11.9100, -12.1300;...

-24.0300, -2.9900, -26.9500;...

-2.4000, -8.7000, 9.3900];

R = [ 5.9700, -0.9200, -1.1800, -7.0600, -1.7900;...

-0.9200, 3.4500, 1.7100, -0.6000, -4.0500;...

-1.1800, 1.7100, 1.1900, 0.5600, -1.6700;...

-7.0600, -0.6000, 0.5600, 9.9200, 4.8500;...

-1.7900, -4.0500, -1.6700, 4.8500, 6.8700] + 1.2\*eye(5);

Ra = chol(R);

Rainv = inv(Ra);

za = Rainv'\*z;

Ha = Rainv'\*H;

[Qb, Rb0] = qr(Ha);

ind = find(Rb0(:, end) ~= 0, 1, 'last');

zb = Qb'\*za;

zbc = zb(1:ind);

Rb = Rb0(1:ind, :);

xhat = inv(Rb)\*zbc;

Rinv = inv(R);

sol = norm(-H'\*Rinv\*(z - H\*xhat)) / norm(-H'\*Rinv\*z);

fprintf('\n\txhat: %1.4f %1.4f %1.4f\n\ttol: %e\n', xhat, sol)

**Output:**

HW2-P4\_midterm

xhat: 1.3847 0.5495 -0.2974

tol: 1.497484e-16