Problem 11:

* Orthogonal basis : which is

1. The first step : choose any for , and normalizing
2. The second

Find orthogonal vector to and normalizing to it

1. The Third

Find orthogonal vector to and normalize it

* The best estimator to x

The performance is

%% computr an orthogonal basis

clear all; clc

v1 =[2 0 1 0 2]';

v2 =[1 sqrt(3) 1 0 0]';

v3 =[0 6 0 -3 0]';

% the first one;

u1 = v1./norm(v1) % u1= [ 0.6667 0 0.3333 0 0.6667]

norm(u1) % check the norm

% the second

ort\_x2 = v2 - dot(v2,u1).\*u1;

u2 = ort\_x2./norm(ort\_x2) % u2 =[ 0.1667 0.8660 0.3333 0 -0.3333]

norm(u2) % check the norm

% the third one

ort\_x3 = v3 - dot(v3,u1).\*u1 - dot(v3,u2).\*u2;

u3 = ort\_x3 ./norm(ort\_x3) % u3 =[ -0.2041 0.3536 -0.4082 -0.7071 0.4082]

norm(u3)

% Projection x into the subspace by u1,u2,u3

x = [4 6 1 -7 -8]';

Best = dot(x,u1)\*u1 + dot(x,u2)\*u2 + dot(x,u3)\*u3;

% Best = [ -0.6051 8.5877 1.1231 -1.8246 -3.4564]

J = (x - Best)'\*(x-Best) % 75.3479

Problem: One of the candidates of Final exam problems.

3.8 / 4.10 / 4.11 / 4.12 / 4.13