Task 1

setup\_lab\_heli\_3d\_simple;

% Fetch linearized system

X0 = zeros(6,1);

[A,B] = linnlsys(X0);

% Define weighting matrices and compute K

Q\_x = diag([1,1,1,0,0,0]);

Q\_u = diag([0.1 0.1]);

K = lqr(A,B,Q\_x,Q\_u);

% If integral gain is present split up into K and K\_I

% K should be 2x6 and K\_I should be 2x2

K\_I = zeros(2);

% Additional voltage, V\_K is scalar (can also be 2x1)

V\_K = 0;

% Output vector if is \eps and \lambda C is 2x6

C = [1,0,0,0,0,0; 0,0,1,0,0,0];

K\_r = -inv(C\*inv(A-B\*K)\*B);

Q\_x = diag([150,10,10,0,0,0]);

A screenshot of a computer

Description automatically generated

A screenshot of a computer screen

Description automatically generated

Q\_x = diag([500,10,10,0,0,0]);

A screenshot of a computer

Description automatically generated

A screenshot of a computer screen

Description automatically generated

Q\_x = diag([600,10,10,0,0,0]);

A screenshot of a computer

Description automatically generated

A screen shot of a computer

Description automatically generated

Q\_x = diag([900,10,10,0,0,0]);

A screenshot of a computer

Description automatically generated

A screen shot of a computer

Description automatically generated

Q\_x = diag([1500,10,10,0,0,0]);

A screenshot of a computer

Description automatically generated

A screen shot of a computer screen

Description automatically generated

V\_k =13

A screen shot of a computer

Description automatically generated

Task 4

A screenshot of a computer

Description automatically generated

Error eliminated

Task 5

A screenshot of a computer

Description automatically generated

A screenshot of a computer

Description automatically generated

Task 6

Weight 9

A screenshot of a computer screen

Description automatically generated

Task 7

Weight 9

Reference varying -15~15

A screen shot of a computer

Description automatically generated

Task 9

From 8

A screenshot of a computer screen

Description automatically generated

From 4

A screenshot of a computer screen

Description automatically generated

Task 10

A screen shot of a computer

Description automatically generated

Task 11

A screenshot of a computer screen

Description automatically generated

Task 12

A screenshot of a computer

Description automatically generated