Tham Jit 1005036 AFC HW2

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| --- | --- |
| Since rank is full, system is completely state controllable  Since rank is full, system is completely observable  Since rank is 1, system is completely output controllable | Since rank is full, system is completely state controllable  Since rank is only 2, system is not completely observable  Since rank is 1, system is completely output controllable |

Roots are



b)

3a)

Since rank is only 2, system is not completely observable

3b)

Since full rank, system in completely observable

4)

For solving non-homogenous equations,

a)

For impulse function , where contains magnitude of function

b)  
For step function , where contains magnitude of function

c)  
For step function , where contains magnitude of function

5)

Statespace representation:

Since rank is full, system is completely state controllable

Desired CE



A=[ 0 1 0;

0 0 1;

-6 -11 -6]

B=[0; 0; 10]

P=[-2+j\*2\*sqrt(3) -2-j\*2\*sqrt(3) -10]

K1=place(A,B,P)

K2=acker(A,B,P)

Values match

|  |
| --- |
| sys = ss(A-B\*K,eye(3),eye(3),eye(3))  initial(sys,[1;0;0]) |
| Steady state values are 0 |

6)

Routh array:

For stability, all coefficients in first coloumn

|  |  |
| --- | --- |
|  |  |

For stability,

Hence, for instability,

7a)

7b)

Since rank is full, system is completely state controllable

Desired CE

7c)

For a servo control system:

|  |
| --- |
| A=[ 0 1 0;  0 0 1;  0 -5 -6]  B=[0; 0; 1]  C=[1 0 0]  D= 0  P=[-2+j\*4 -2-j\*4 -10]  K=place(A,B,P)  sys\_controller=ss(A-B\*K,B.\*K(1),C,D)  step(sys\_controller) |
|  |

8)

Checking for observability:

Since matrix is full rank, system is completely observable