Question 3, Part B

Matlab Code

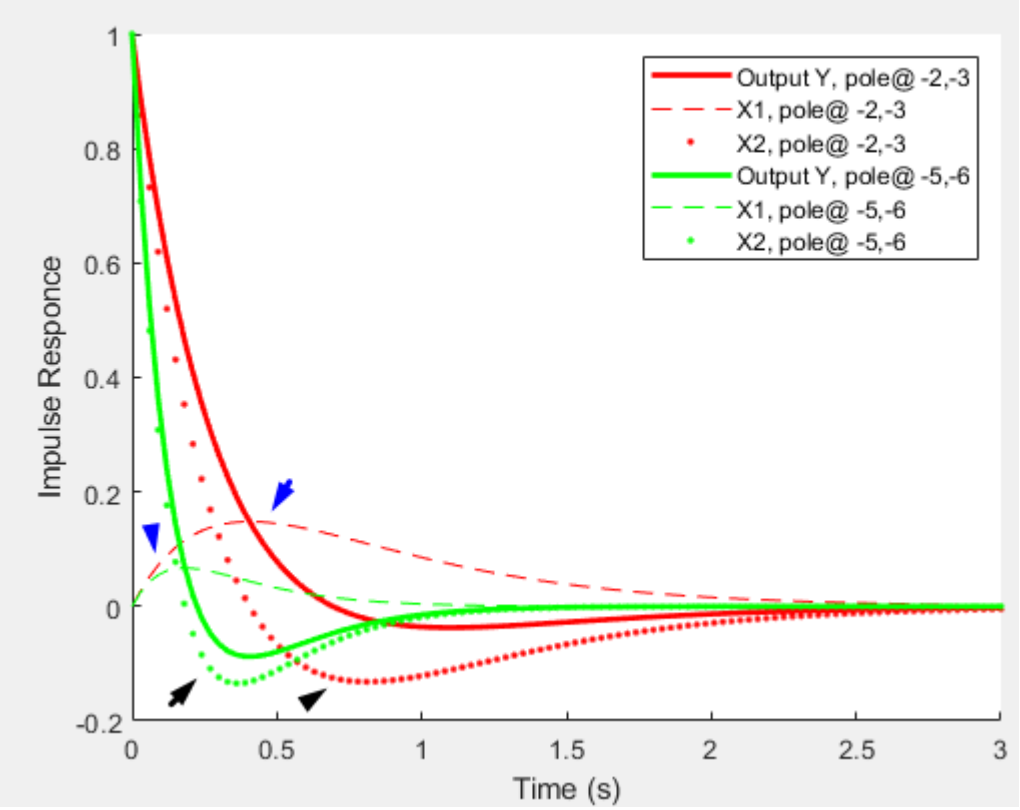
```
A1=[0,1;-6,-5];
A2=[0,1;-30,-11];
B=[0;1];
C=[1,1];
D=[0];
s1=ss(A1,B,C,D);
s2=ss(A2,B,C,D);

[y1,tOut,x1] = impulse(s1,3);
[y2,tOut,x2] = impulse(s2,tOut);
figure(1), clf, hold on

plot(tOut,y1,"r","linewidth",2)
plot(tOut,x1(:,1),"r--")
plot(tOut,x1(:,2),"r.")
plot(tOut,y2,"g","linewidth",2)
plot(tOut,x2(:,1),"g--")
plot(tOut,x2(:,2),"g.")

xlabel("Time (s)")
ylabel("Impulse Responce")

legend("Output Y, pole@ -2,-3","X1, pole@ -2,-3","X2, pole@ -2,-3","Output Y,
pole@ -5,-6","X1, pole@ -5,-6","X2, pole@ -5,-6")
```



The rapid decade can be found in the green X2 where the decade time constant is larger, when compared with the model with smaller pole values, indicated by dark arrows. As a result, the X1 got a larger integrated value in the slow responding model (blue arrows). The overall result is a more lowpass response to the impulse input when the poles have large values.