MAE 144 HW01

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1. https://github.com/DVZepeda

2.

a)

$$G(s) = \frac{(s+2)(s-2)(s+5)(s-5)}{(s+1)(s-1)(s+3)(s-3)(s+6)(s-6)} = \frac{b(s)}{a(s)}$$

In order to get target poles of (-1 -1 -3 -3 -6 -6) for T(s) I used the Diophantine method which yielded the Controller:

$$D(s) = \frac{(s+6)(s+3)(s+1)(s-1.2681)(s-5.3235)}{(s+5.0009)(s+2.003)(s-3.5955)}$$

The roots of "test" are equal to the target roots & the residual is near zero
so D(s) = y(s)/x(s) is correct.

b)

The controller in part a is **improper**. K *(ie. number of added poles)* needs to be at least 5 in order to make D(s) proper. One thing I noticed is that as the K value increases, your residual value increases as well. In other words the difference between your target f(s) and actual f(s) increase leading to a controller that is increasingly further away from your target poles.

3.

I think that My code could have been better in than the matlab version as I've added the ability to specify causality and the omega_bar values.