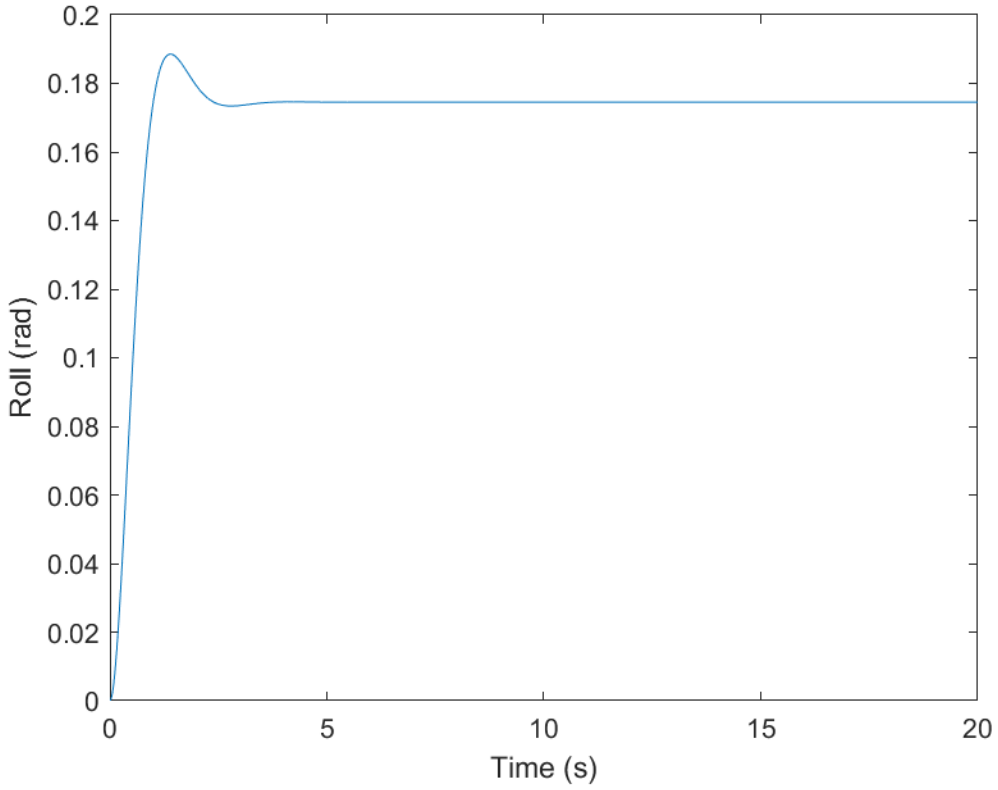
Noe Lepez Da Silva Duarte

AE 4610 – Lab 3 data

1. a. Initial Roll gains - Kd = 25.4594, Kp = 29.3417
   b. Initial Pitch gains - Kd = 33.4062, Kp = 35.3998, Ki = 0.3540
   c. Initial yaw rate controller gains - Kp = 1.4853, Ki = 0.0149

2. Isolated Roll, Pitch, & Yaw Rate simulink models and step responses, with both the plot and a capture of the information provided by the "stepinfo" Matlab function. For the report, you need only include the relevant stepinfo information (e.g. peak time/rise time, settling time)

Roll:



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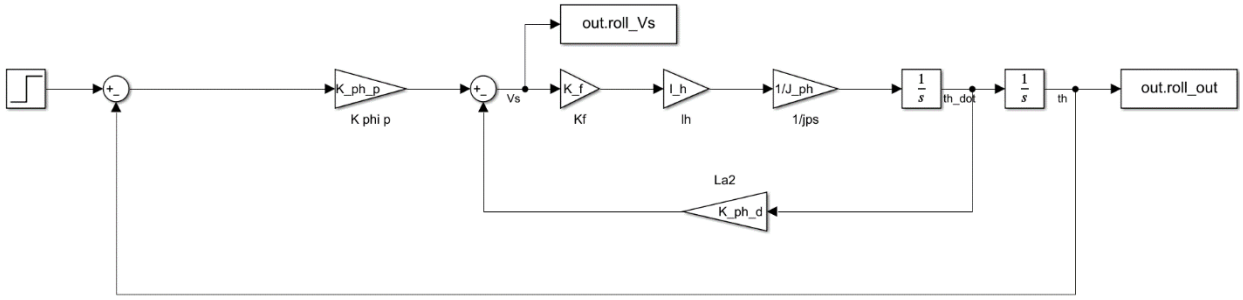
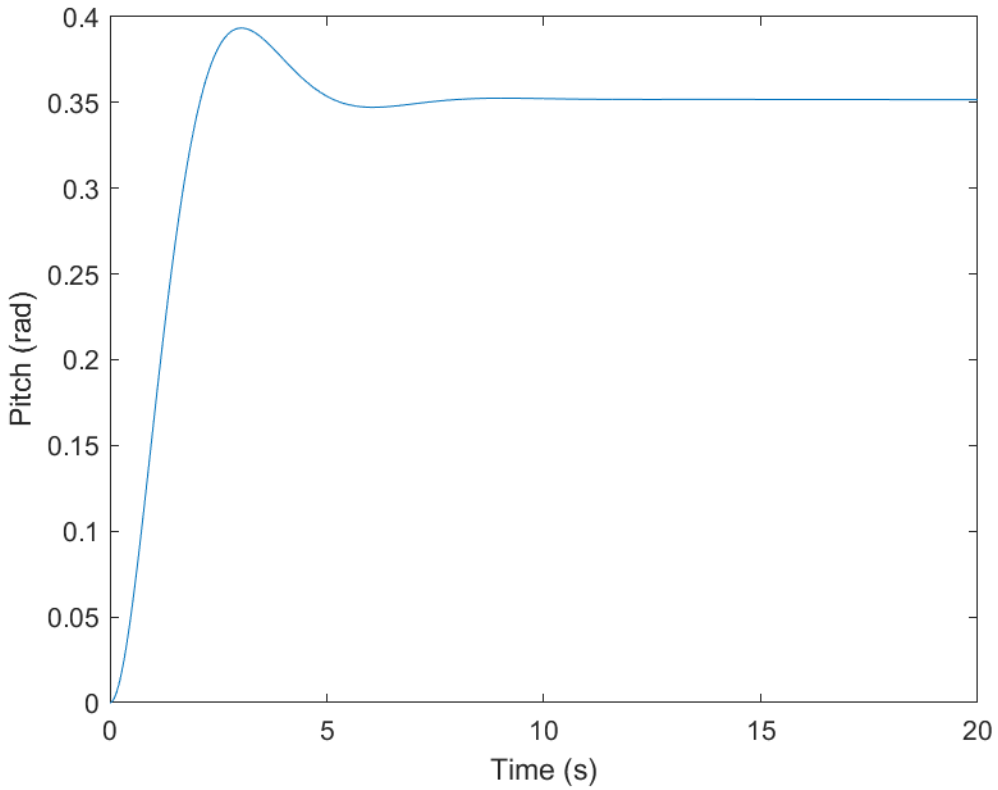
```
      RiseTime: 1.4071
TransientTime: 4.2285
 SettlingTime: 4.2285
  SettlingMin: 0.3165
  SettlingMax: 0.3934
    Overshoot: 11.8782
   Undershoot: 0
         Peak: 0.3934
     PeakTime: 3.0300
```



Pitch:



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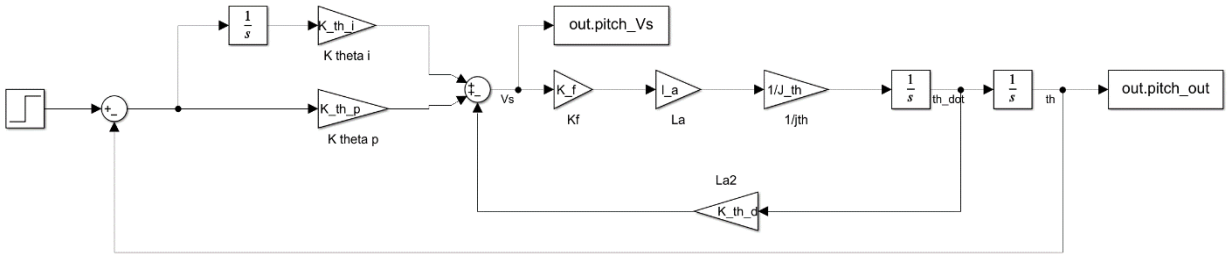
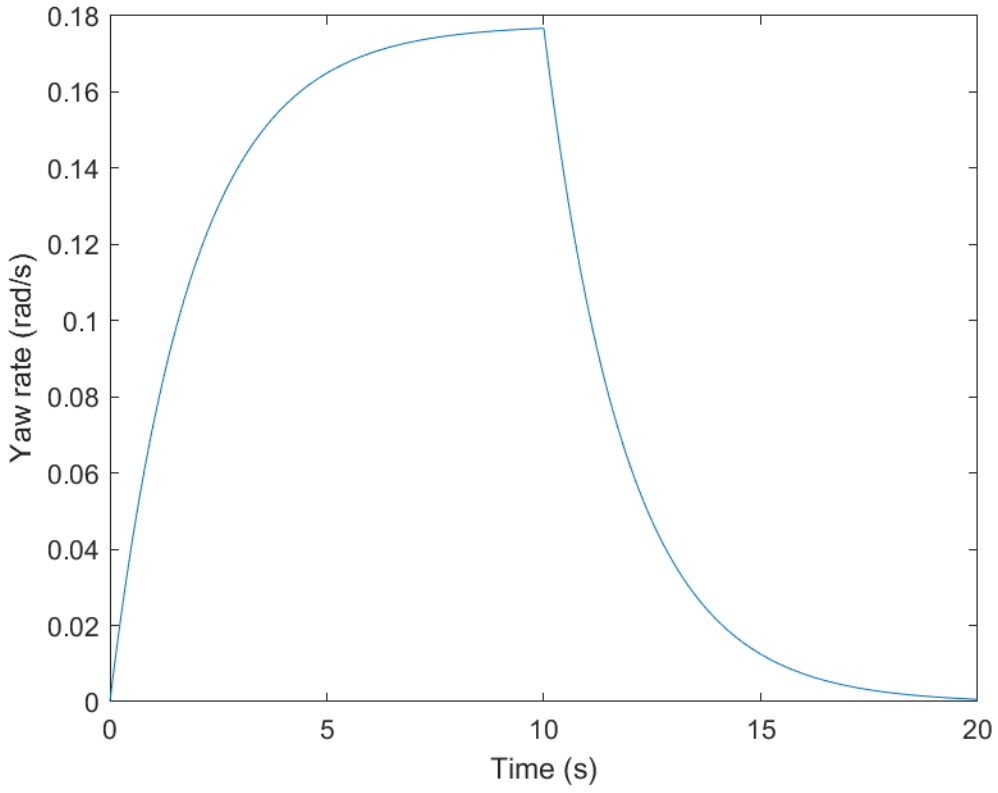
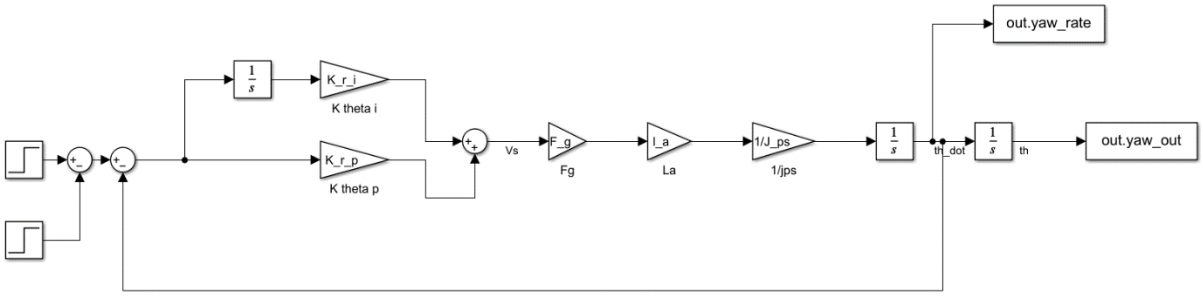



```
      RiseTime: 0.6650
TransientTime: 1.7841
 SettlingTime: 1.7841
  SettlingMin: 0.1574
  SettlingMax: 0.1885
    Overshoot: 8.0200
   Undershoot: 0
         Peak: 0.1885
     PeakTime: 1.4000
```

Yaw:



```
      RiseTime: 4.0773
TransientTime: 5.4921
 SettlingTime: 5.4921
  SettlingMin: 0.1591
  SettlingMax: 0.1767
    Overshoot: 0
   Undershoot: 0
         Peak: 0.1767
     PeakTime: 9.9800
```



3. Combined nonlinear Simulink model, with the Yaw Rate step response validated with both a plot and "stepinfo" information

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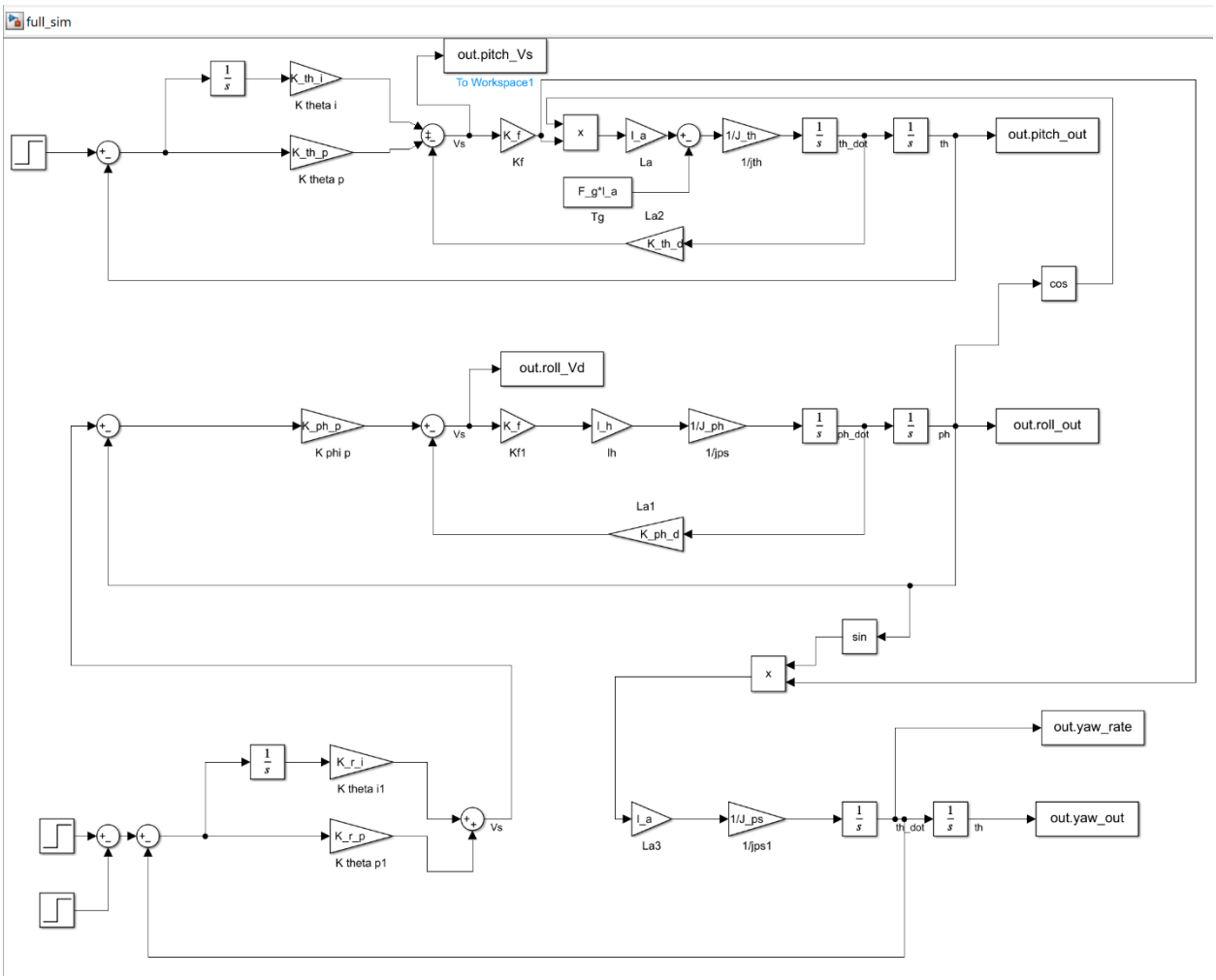
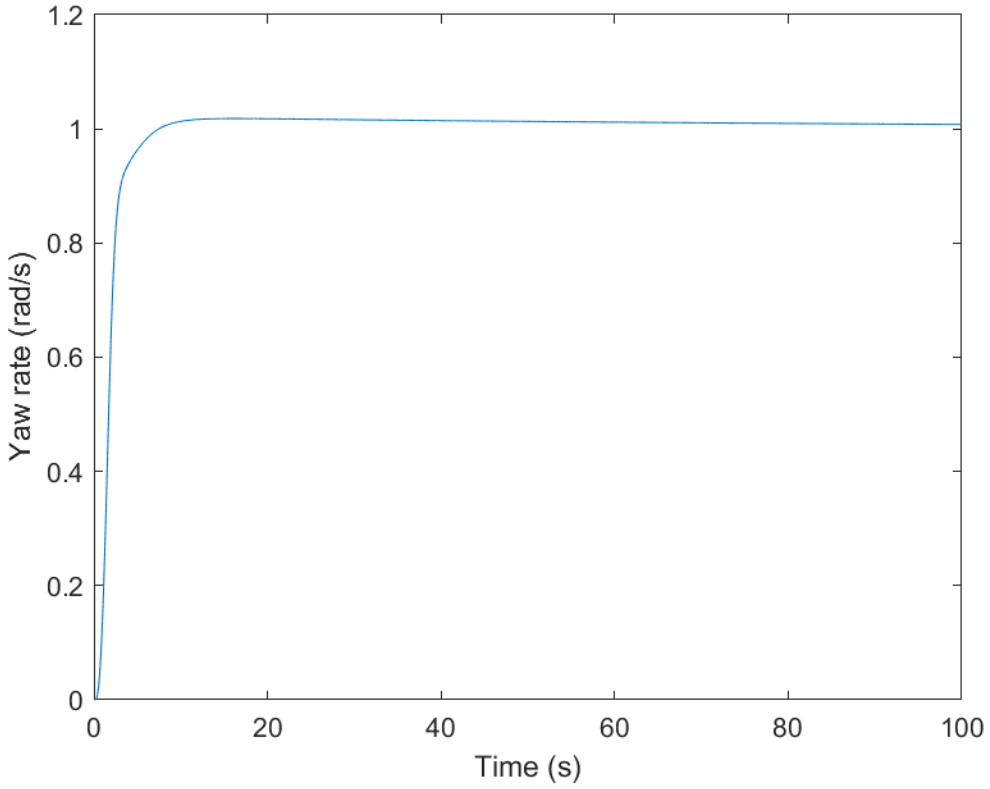



```
     RiseTime: 2.3128
TransientTime: 4.7433
 SettlingTime: 4.7433
  SettlingMin: 0.9075
  SettlingMax: 1.0182
    Overshoot: 1.0224
   Undershoot: 0
         Peak: 1.0182
     PeakTime: 16.1900
```



4. a. Final Roll gains - Kd = 12.7297, Kp = 29.3417
   b. Final Pitch gains - Kd = 31.7350, Kp = 35.3998, Ki = 0.3540
   c. Final yaw rate controller gains - Kp = 1.0397, Ki = 0.0104

5. Pitch, Yaw Rate, and Yaw attitude plots for the case of Pitch command of 0 degrees

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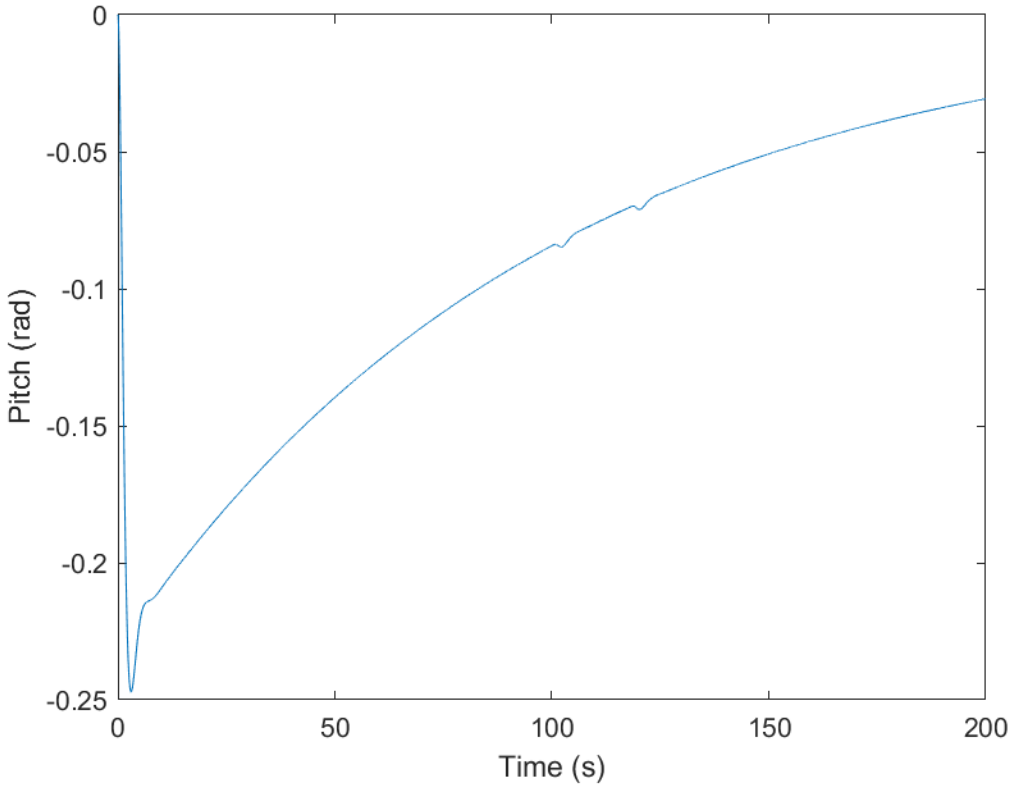

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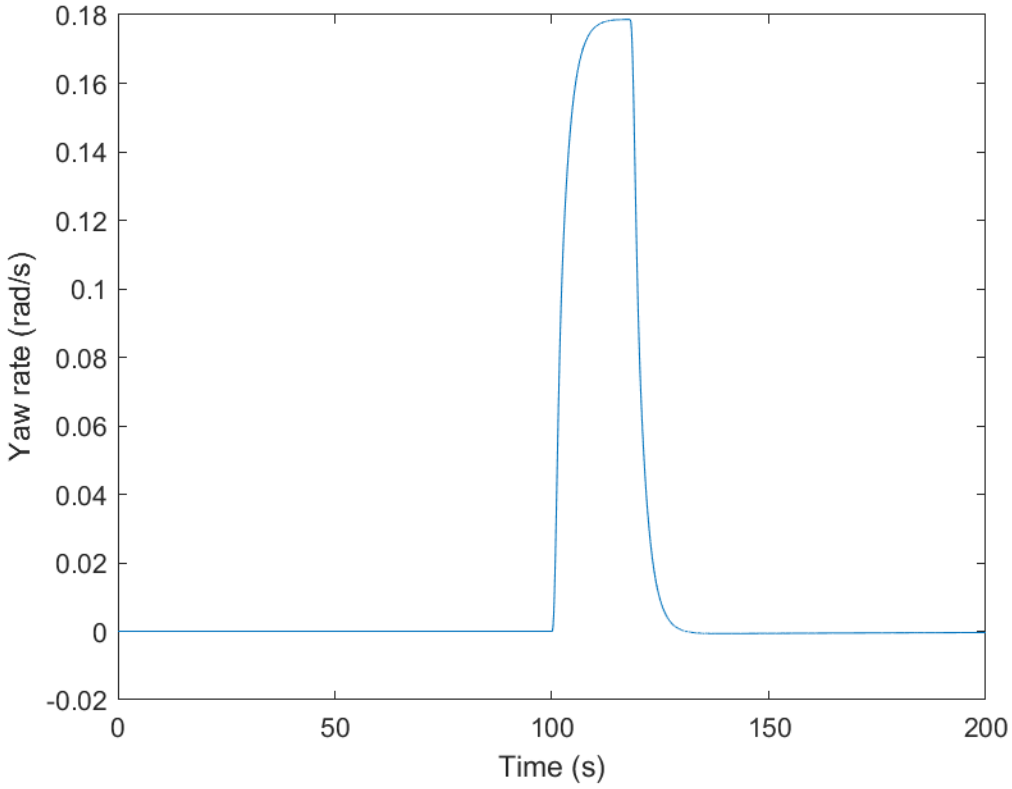
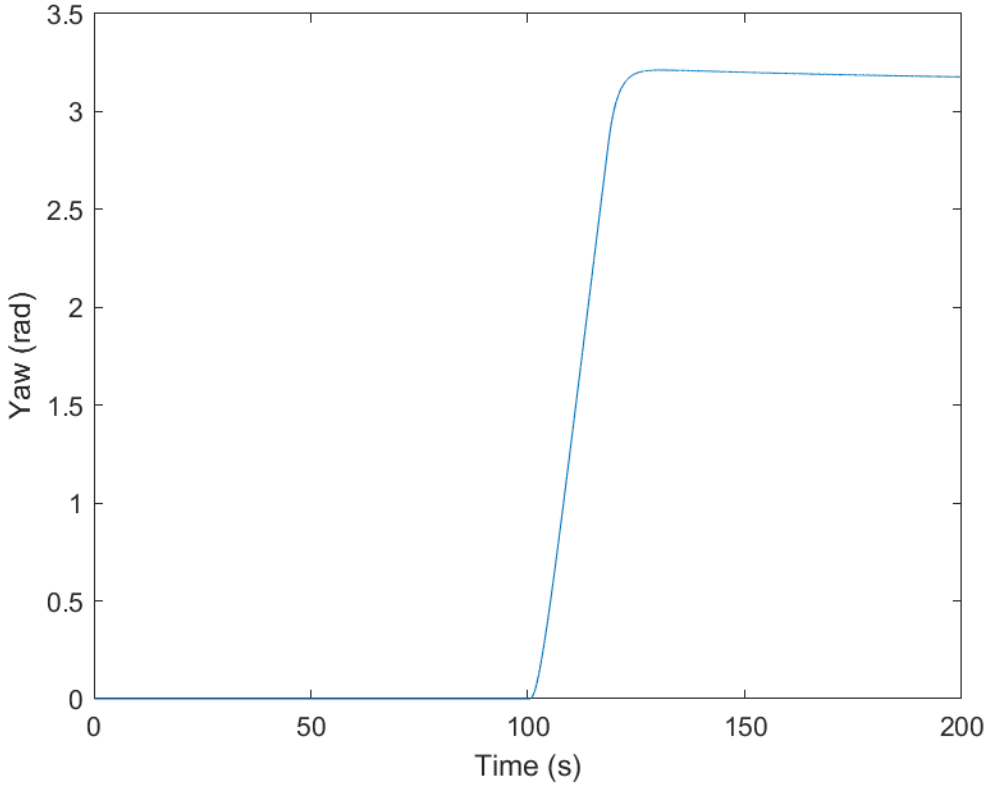
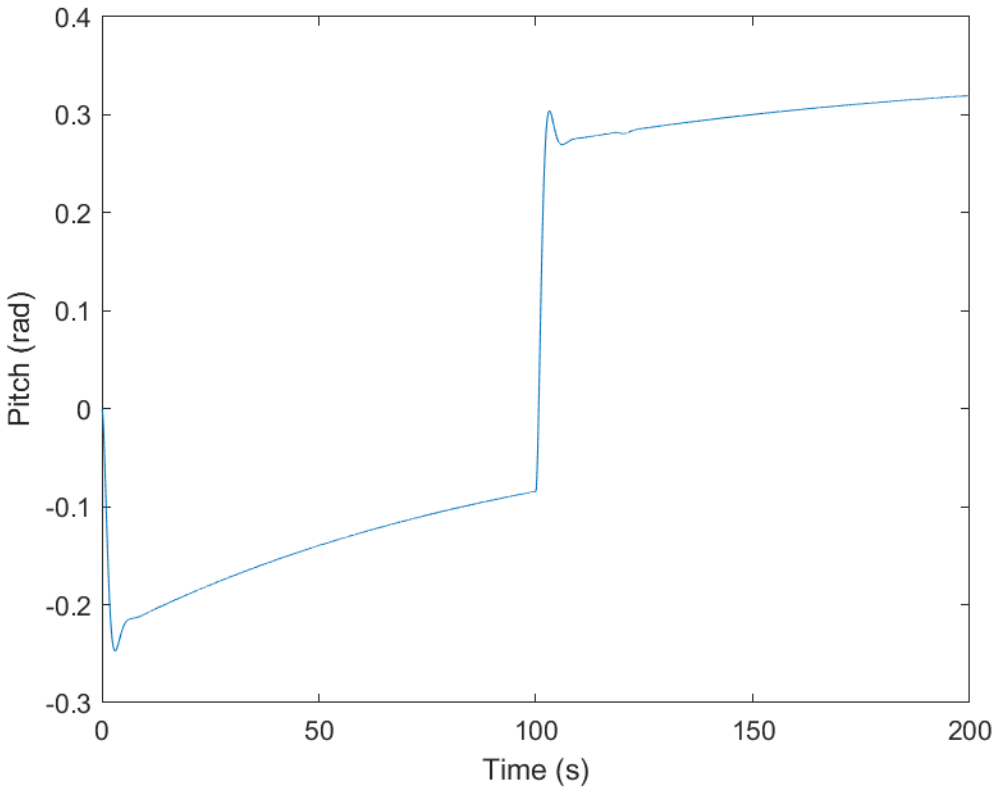
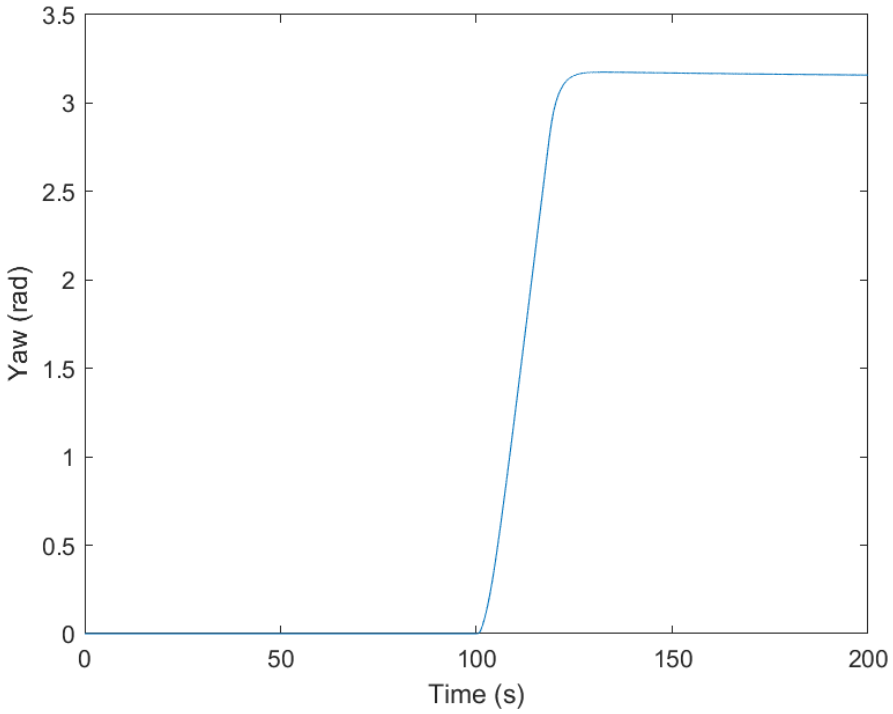
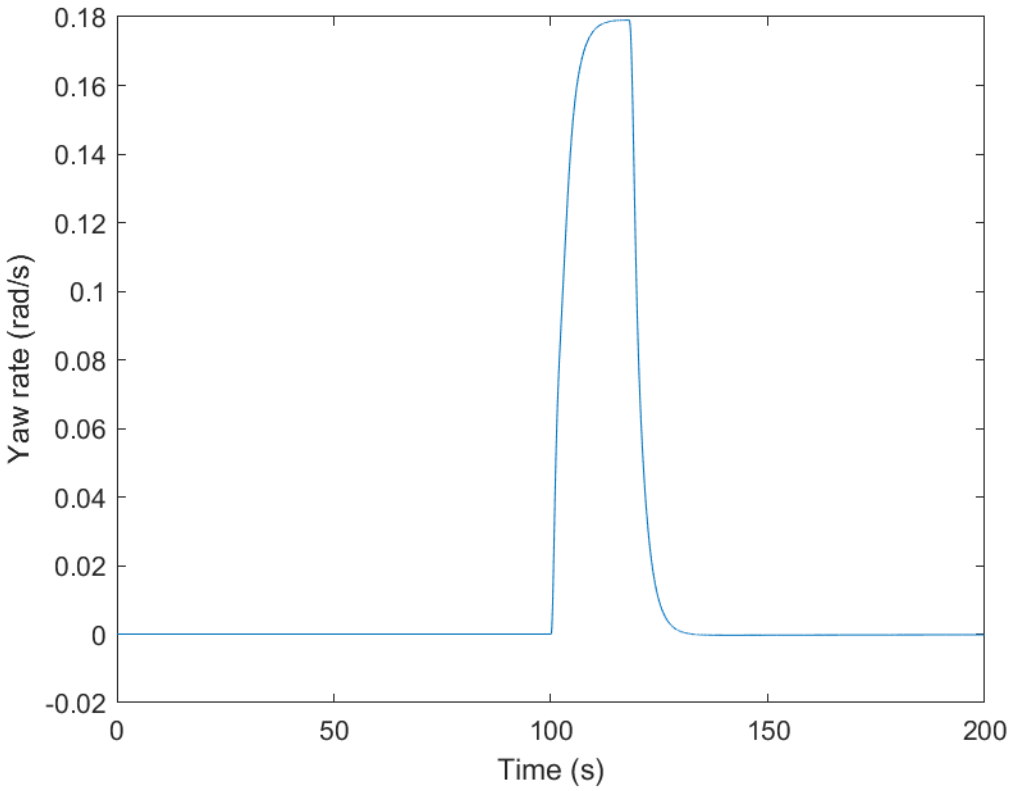




6. Pitch, Yaw Rate, and Yaw attitude plots for the case of Pitch command of 20 degrees







7. The length of time required for the 3DOF helicopter to rotate 180 degrees for each pitch command (list each time separately, even if you find the time to be the same)
    a. 18s
    b. 18s