```
close all; clear; clc;
```

Tests

```
load("Data_ft3.mat")
filters = (Cessnafull.vZ__ms)<500 & (Cessnafull.vZ__ms)>-500 ...
    & Cessnafull.alt_1ftmsl < 5200 & Cessnafull.alt_1ftmsl > 4800;
velocity = Cessnafull.Vtrue_ktas(filters);
% figure
% plot(Cessnafull.Vind_kias,'.')

xvec = [631,695,777,855,979];

for ii = 1:5
    table2(ii,:) = printItem2(Cessnafull,xvec(ii),ii);
end
disp(table2)
```

```
BHP = [106,109,114,126,138];
for ii = 1:5
    table3(ii,:) =
 printItem3(Cessnafull,xvec(ii),table2(ii,:),BHP(ii));
end

figure
hold on
cdtas = fit(table2(:,5),table2(:,13), 'exp2');
plot(cdtas,table2(:,5),table2(:,13),'*')
cdtas3 = fit(table3(:,3),table3(:,6), 'exp2');
plot(cdtas3,table3(:,3),table3(:,6),'*')
ylabel('CD')
xlabel('TAS')
hold off
legend("X-Plane Data","X-Plane Curve Fit", "Calculated
 Data", "Calculated Curve Fit")

figure
hold on
claoa = fit(table2(:,7),table2(:,8), 'poly1');
plot(claoa,table2(:,7),table2(:,8),'*')
claoa = fit(table3(:,8),table3(:,7), 'poly1');
plot(claoa,table3(:,8),table3(:,7),'*')
hold off
ylabel('CL')
xlabel('AoA')
legend("X-Plane Data","X-Plane Curve Fit", "Calculated
 Data", "Calculated Curve Fit")
```

```
figure
hold on
cdcl = fit(table2(:,8),table2(:,13), 'exp2');
plot(cdcl,table2(:,8),table2(:,13),'*')
cdcl = fit(table3(:,7),table3(:,6), 'exp2');
plot(cdcl,table3(:,7),table3(:,6),'*')
hold off
ylabel('CD')
xlabel('CL')
legend("X-Plane Data","X-Plane Curve Fit", "Calculated
 Data", "Calculated Curve Fit")

figure
hold on
ldratio = fit(table2(:,5),table2(:,14), 'poly2');
plot(ldratio,table2(:,5),table2(:,14),'*')
xlabel('TAS')
ylabel('L/D')
disp(ldratio)

disp(table3)
function row = printItem2(data,x,num)
    row(1) = num;
    row(2) = data.real_time(x-5);
    row(3) = data.real_time(x);
    row(4) = data.Vind_kias(x);
    row(5) = data.Vtrue_ktas(x);
    row(6) = data.alt_1ftmsl(x);
    row(7) = data.alpha__deg(x);
    row(8) = data.cltotal(x);
    row(9) = data.curnt___lb(x);
    row(10) = data.MP__1_inhg(x);
    row(11) = data.rpm_1_prop(x);
    row(12) = data.thrst_1lb(x);
    row(13) = data.cdtotal(x);
    row(14) = data.LDratio(x);
    fprintf("\nTest Point Number: \t%d \n", num)
    fprintf("Start Time: \t\t%f \n", data.real_time(x-5))
    fprintf("End Time: \t\t%f\n", data.real_time(x))
    fprintf("IAS: \t\t\t%f \n", data.Vind_kias(x))
    fprintf("TAS: \t\t\t%f \n", data.Vtrue_ktas(x))
    fprintf("Altitude: \t\t%f \n", data.alt_1ftmsl(x))
    fprintf("AoA: \t\t\t%f \n", data.alpha__deg(x))
    fprintf("CL: \t\t\t%f \n", data.cltotal(x))
    fprintf("Weight: \t\t%f \n", data.curnt___lb(x))
    fprintf("Manifold Pressure: \t%f \n", data.MP__1_inhg(x))
    fprintf("RPM: \t\t\t%f \n", data.rpm_1_prop(x))
    fprintf("Thrust: \t\t%f \n", data.thrst_1lb(x))
    fprintf("L/D: \t\t\t%f \n", data.LDratio(x))
end

function row = printItem3(data,x,point,BHP)
    qbar = .5*(20.48e-4)*(point(5)*1.68781)^2;
    TAS = point(4)*sqrt(23.77e-4/20.48e-4);
```

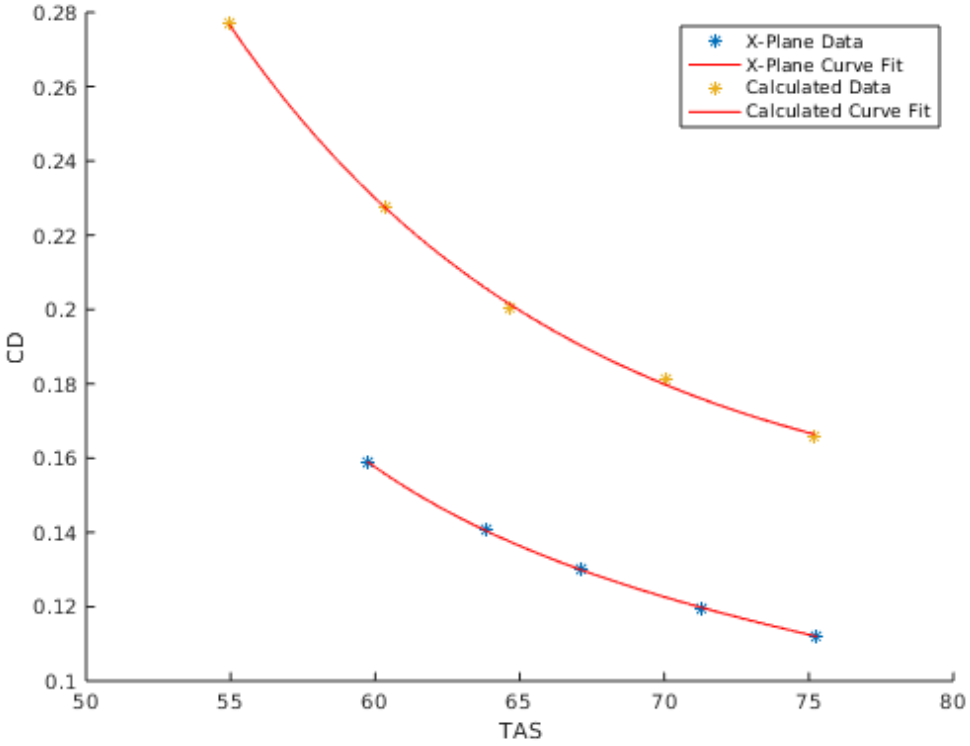
```
    thrust = 325*.8*BHP/TAS;
    cd = thrust/(qbar*174);
    row(1) = point(1);
    row(2) = data.flaphandl(x);
    row(3) = TAS;
    row(4) = thrust;
    row(5) = qbar;
    row(6) = cd;
    row(7) = point(8);
    row(8) = point(7);
    row(9) = point(8)/cd;

    fprintf("\nTest Point Number: \t%d \n", point(1))
    fprintf("Flap Setting: \t\t%f \n", data.flaphandl(x))
    fprintf("TAS: \t\t\t%f \n", point(4)*sqrt(23.77e-4/20.48e-4))
    fprintf("Drag: \t\t\t%f \n", thrust)
    fprintf("Q_bar: \t\t\t%f \n", qbar)
    fprintf("C_D: \t\t\t%f \n", cd)
    fprintf("C_L: \t\t\t%f \n", data.cltotal(x))
    fprintf("AoA: \t\t\t%f \n", data.alpha__deg(x))
end
```

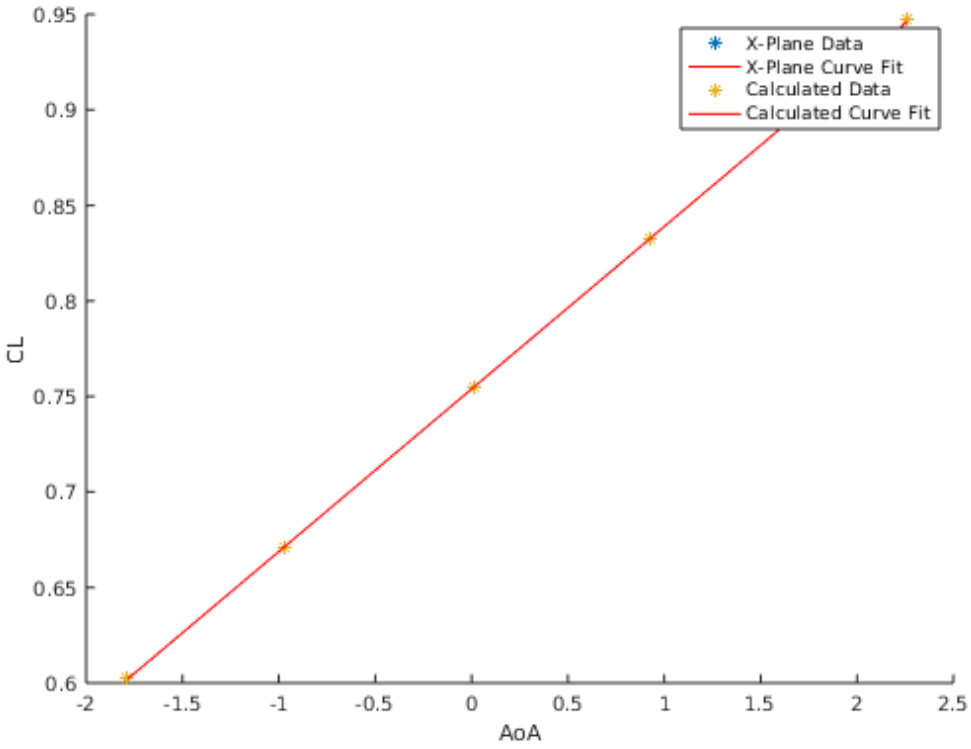
```
Test Point Number:  1
Start Time:   717.727360
End Time:   722.789120
IAS:    51.010590
TAS:    59.727600
Altitude:   5012.728030
AoA:    2.261190
CL:    0.946910
Weight:   2009.457640
Manifold Pressure:  20.664880
RPM:    2092.385990
Thrust:   335.248170
L/D:    5.952450

Test Point Number:  2
Start Time:   782.826420
End Time:   787.918640
IAS:    55.990060
TAS:    63.816420
Altitude:   5012.815920
AoA:    0.930420
CL:    0.832700
Weight:   2008.420650
Manifold Pressure:  21.211710
RPM:    2134.804440
Thrust:   337.838620
L/D:    5.926240

Test Point Number:  3
Start Time:   866.134950
End Time:   871.173160
```

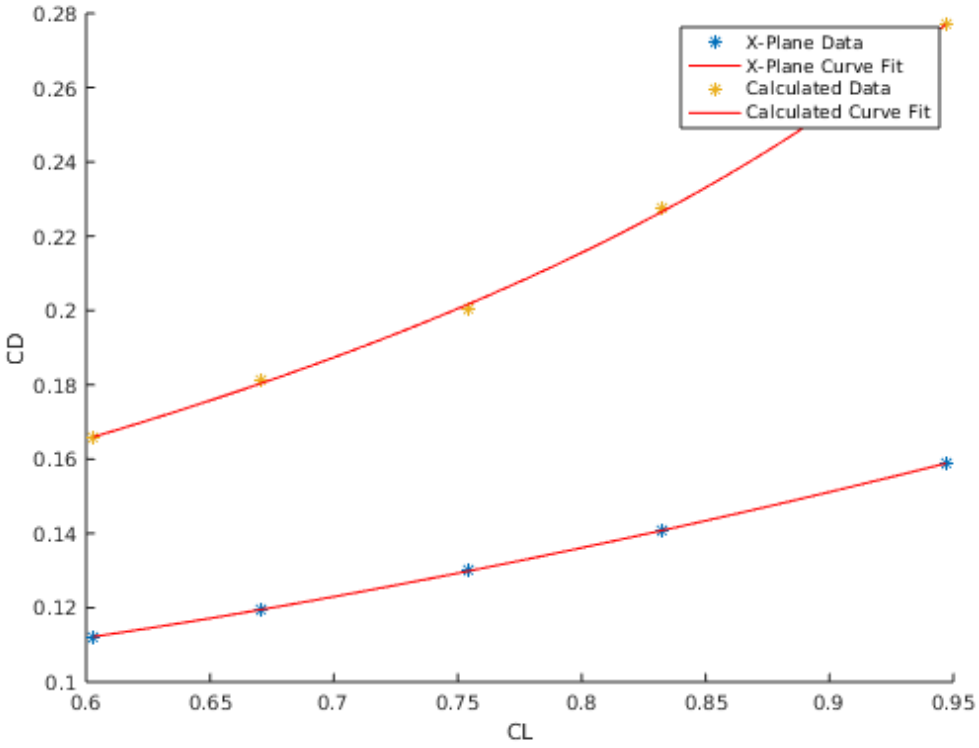
```
IAS:    60.001140
TAS:    67.127670
Altitude:   5012.683590
AoA:    0.018530
CL:    0.754410
Weight:   2007.046750
Manifold Pressure:  21.932580
RPM:    2180.278560
Thrust:   345.543950
L/D:    5.807090

Test Point Number:  4
Start Time:   1052.082890
End Time:   1057.154420
IAS:    65.018430
TAS:    71.293250
Altitude:   5012.604490
AoA:    -0.972260
CL:    0.670840
Weight:   2005.582640
Manifold Pressure:  23.085730
RPM:    2243.445070
Thrust:   358.648620
L/D:    5.615350

Test Point Number:  5
Start Time:   1177.252440
End Time:   1182.323610
IAS:    69.802100
TAS:    75.284290
Altitude:   5012.684080
AoA:    -1.784930
CL:    0.602950
Weight:   2003.034420
Manifold Pressure:  24.581030
RPM:    2311.814210
Thrust:   375.969510
L/D:    5.372160
   1.0e+03 *

  Columns 1 through 7

    0.0010    0.7177    0.7228    0.0510    0.0597    5.0127    0.0023
    0.0020    0.7828    0.7879    0.0560    0.0638    5.0128    0.0009
    0.0030    0.8661    0.8712    0.0600    0.0671    5.0127    0.0000
    0.0040    1.0521    1.0572    0.0650    0.0713    5.0126   -0.0010
    0.0050    1.1773    1.1823    0.0698    0.0753    5.0127   -0.0018

  Columns 8 through 14

    0.0009    2.0095    0.0207    2.0924    0.3352    0.0002    0.0060
    0.0008    2.0084    0.0212    2.1348    0.3378    0.0001    0.0059
    0.0008    2.0070    0.0219    2.1803    0.3455    0.0001    0.0058
    0.0007    2.0056    0.0231    2.2434    0.3586    0.0001    0.0056
```

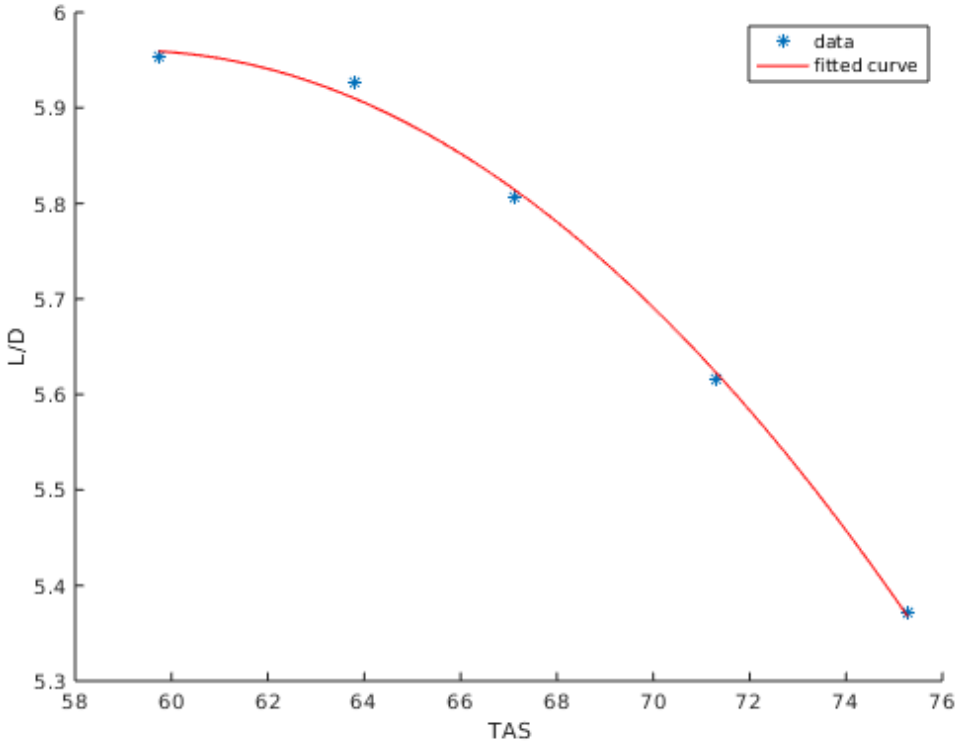
```
    0.0006    2.0030    0.0246    2.3118    0.3760    0.0001    0.0054


Test Point Number:  1
Flap Setting:   1.000000
TAS:    54.955348
Drag:    501.498054
Q_bar:    10.406320
C_D:    0.276964
C_L:    0.946910
AoA:    2.261190

Test Point Number:  2
Flap Setting:   1.000000
TAS:    60.319891
Drag:    469.828436
Q_bar:    11.879877
C_D:    0.227289
C_L:    0.832700
AoA:    0.930420

Test Point Number:  3
Flap Setting:   1.000000
TAS:    64.641156
Drag:    458.531401
Q_bar:    13.144686
C_D:    0.200479
C_L:    0.754410
AoA:    0.018530

Test Point Number:  4
Flap Setting:   1.000000
TAS:    70.046444
Drag:    467.689694
Q_bar:    14.826679
C_D:    0.181286
C_L:    0.670840
AoA:    -0.972260

Test Point Number:  5
Flap Setting:   1.000000
TAS:    75.200045
Drag:    477.127371
Q_bar:    16.533157
C_D:    0.165855
C_L:    0.602950
AoA:    -1.784930
     Linear model Poly2:
     ldratio(x) = p1*x^2 + p2*x + p3
     Coefficients (with 95% confidence bounds):
       p1 =   -0.002259  (-0.003401, -0.001116)
       p2 =      0.2669  (0.1124, 0.4213)
       p3 =      -1.924  (-7.116, 3.267)
  Columns 1 through 7
```

```
    1.0000    1.0000   54.9553  501.4981   10.4063    0.2770    0.9469
    2.0000    1.0000   60.3199  469.8284   11.8799    0.2273    0.8327
    3.0000    1.0000   64.6412  458.5314   13.1447    0.2005    0.7544
    4.0000    1.0000   70.0464  467.6897   14.8267    0.1813    0.6708
    5.0000    1.0000   75.2000  477.1274   16.5332    0.1659    0.6029

Columns 8 through 9

    2.2612    3.4189
    0.9304    3.6636
    0.0185    3.7630
   -0.9723    3.7004
   -1.7849    3.6354
```




X-Plane Data
X-Plane Curve Fit
Calculated Data
Calculated Curve Fit
CL
AoA
0.95
0.9
0.85
0.8
0.75
0.7
0.65
0.6
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5


X-Plane Data
X-Plane Curve Fit
Calculated Data
Calculated Curve Fit
CD
CL
0.28
0.26
0.24
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.6
0.65
0.7
0.75
0.8
0.85
0.9
0.95



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