```
clear
close all
```

Variables and Data

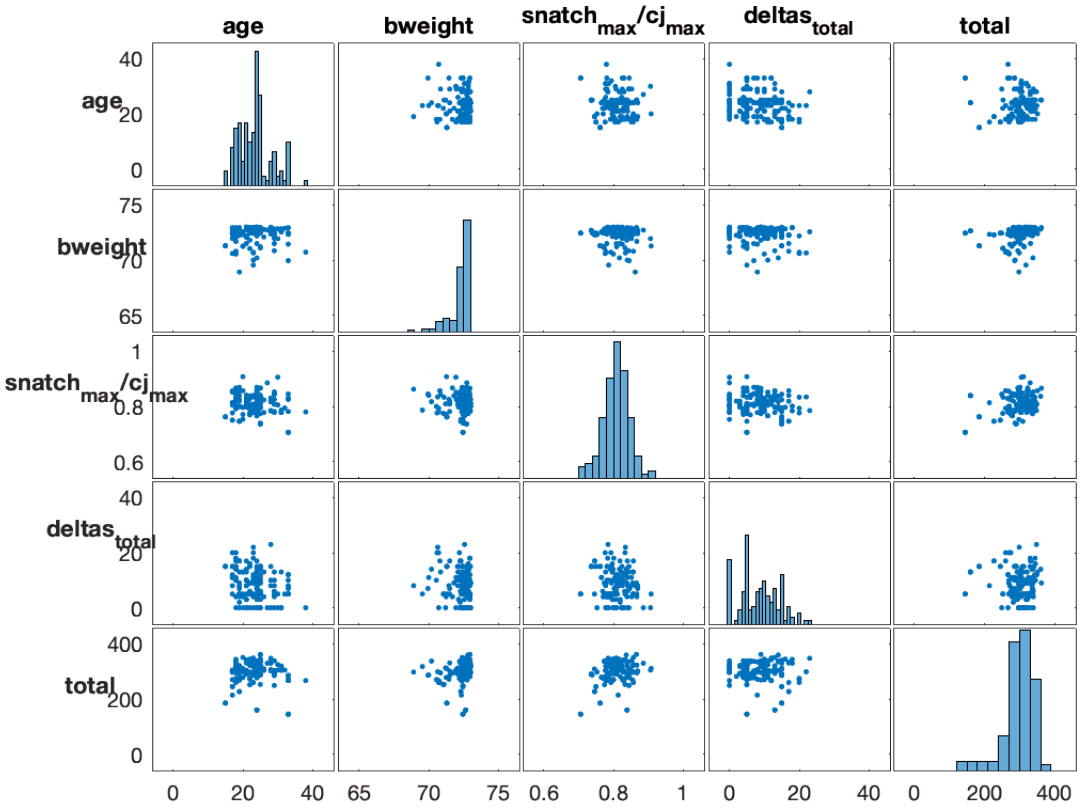
```
% import data from men's 73 kg weight class
data = csvread('class73.csv');

sex                          = data(:,1);  % sex
age                          = data(:,2);  % age
bweight                      = data(:,3);  % body weight
snatch_firstAttempt          = data(:,4);  % declared snatch weight
snatch_firstSuccess          = data(:,5);  % first successful snatch weight
snatch_max                   = data(:,6);  % max snatch weight
snatch_max2declared          = data(:,7);  % delta between max and declared
snatch_max2firstSuccess      = data(:,8);  % delta between first success and max
cj_firstAttempt              = data(:,9);  % declared clean-jerk weight
cj_firstSuccess              = data(:,10);  % first successful clean-jerk weight
cj_max                       = data(:,11); % max clean-jerk weight
cj_max2declared              = data(:,12); % delta between max and declared
cj_max2firstSuccess          = data(:,13); % delta between first success and max
total                        = data(:,14); % total max weight "score"
```

Derived Metrics

```
% Snatch to CJ ratio
snatch_ratio = snatch_max./cj_max;
% Sum of deltas between declared and max across both events
total_deltas = cj_max2declared + snatch_max2declared;
```

Initial Model - age, body weight, snatch ratio, deltas

```
dm = [age, bweight, snatch_ratio, total_deltas, total];

labels = {...
    'age',...
    'bweight',...
    'snatch_{max}/cj_{max}',...
    'deltas_{total}',...
    'total'...
    };

% Create the plot matrix
[~,ax] = plotmatrix(dm);
for i = 1:length(labels)
  title(ax(1,i), labels{i})
  yl = ylabel(ax(i,1),labels{i},'fontweight','bold','Rotation', 0);
  yl.Position(1) = yl.Position(1) - 3.0;
end
```




```
mdl1 = fitlm([age, bweight, snatch_ratio, total_deltas],total,'VarNames',{'age' 'bweight','sna
```

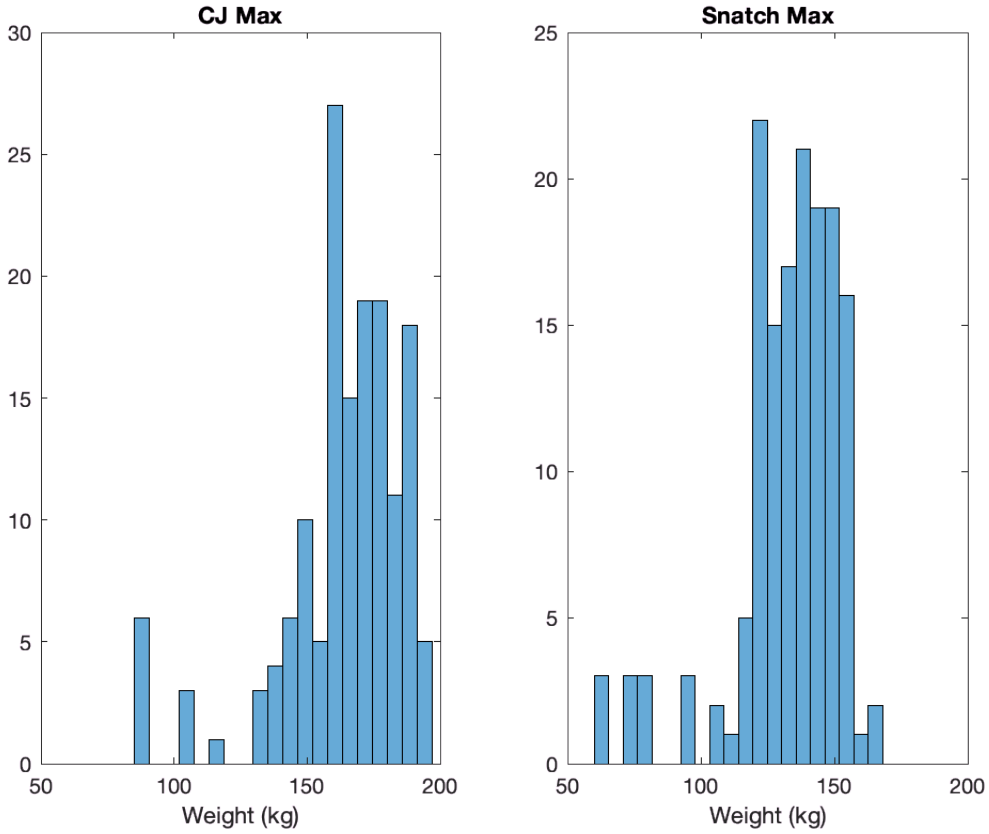
```
mdl1 =

Linear regression model:
    total ~ 1 + age + bweight + snatch_max/cj_max + total_deltas

Estimated Coefficients:
                          Estimate       SE         tStat        pValue
                          _________    _______    _________    __________

    (Intercept)             -1173.8     330.19      -3.5551    0.00050869
    age                    -0.028664    0.73825    -0.038827       0.96908
    bweight                     15.3     4.3235       3.5388    0.00053846
    snatch_max/cj_max            450     89.965        5.002     1.597e-06
    total_deltas            0.064145    0.62528      0.10259       0.91843


Number of observations: 152, Error degrees of freedom: 147
Root Mean Squared Error: 39.7
R-squared: 0.194,  Adjusted R-Squared 0.172
F-statistic vs. constant model: 8.85, p-value = 1.99e-06
```

Initial Findings:

Age and total deltas are not statistically significant. Resvised model will exclude these two variables

Auxiliary Plots

```
% Generate CJ max and snatch max histograms
figure
subplot(1,2,1)
histogram(cj_max,20)
title('CJ Max')
xlabel('Weight (kg)')
subplot(1,2,2)
histogram(snatch_max,20)
title('Snatch Max')
xlabel('Weight (kg)')
```



Revised Model - body weight, snatch ratio

```
mdl2 = fitlm([bweight, snatch_ratio],total,'VarNames',{'bweight','snatch_max/cj_max','total'})
```

```
mdl2 =

Linear regression model:
    total ~ 1 + bweight + snatch_max/cj_max

Estimated Coefficients:
                        Estimate      SE       tStat       pValue
                        ________    ______    _______    __________

    (Intercept)          -1167.3    321.28    -3.6333    0.00038446
    bweight               15.221    4.2439     3.5866    0.00045363
```

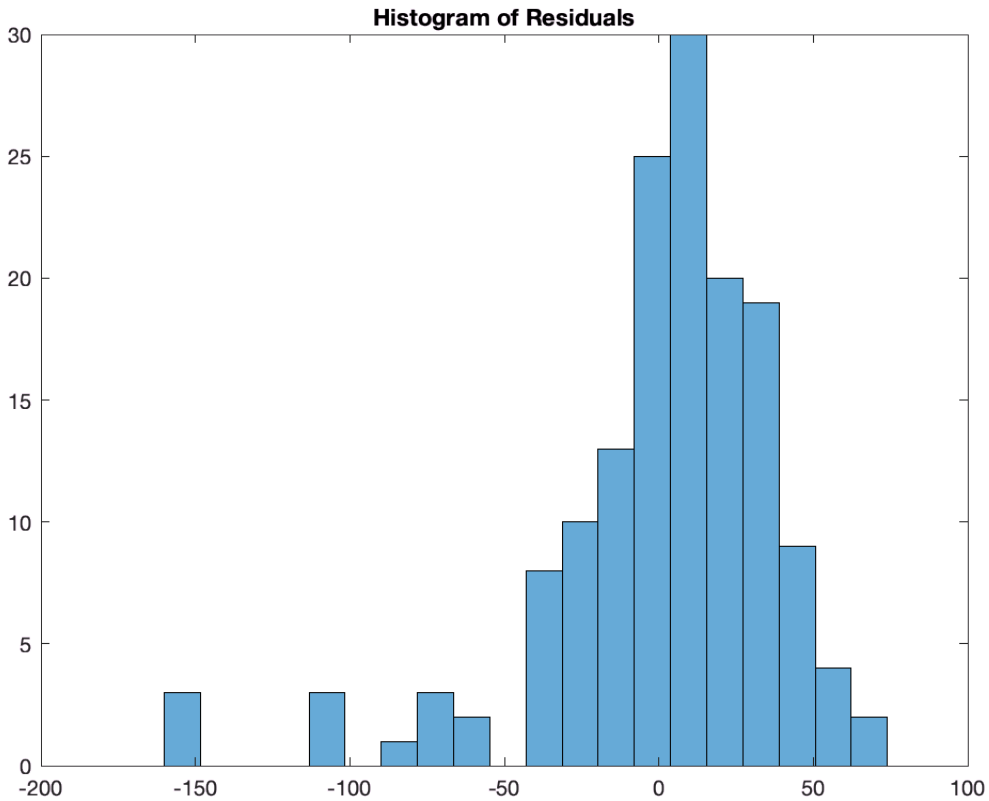
```
    snatch_max/cj_max     448.81     87.964     5.1022    1.0076e-06

Number of observations: 152, Error degrees of freedom: 149
Root Mean Squared Error: 39.4
R-squared: 0.194,  Adjusted R-Squared 0.183
F-statistic vs. constant model: 17.9, p-value = 1.06e-07
```

```
% Generate the confidence interterval for the model
coefCI(mdl2)
```

```
ans =

   1.0e+03 *
   -1.8021   -0.5324
    0.0068    0.0236
    0.2750    0.6226
```

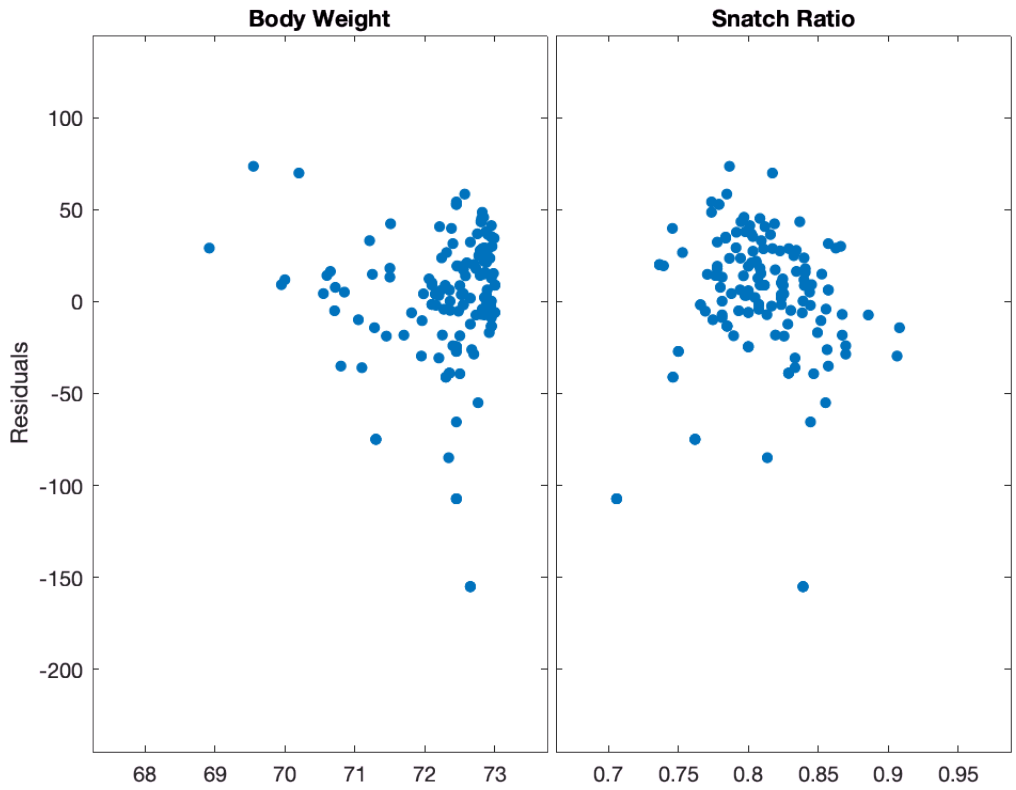
Revised Model: Residuals

```
% Generate plot raw residuals
r2 = mdl2.Residuals.Raw;
figure
histogram(r2,20)
title('Histogram of Residuals')
```

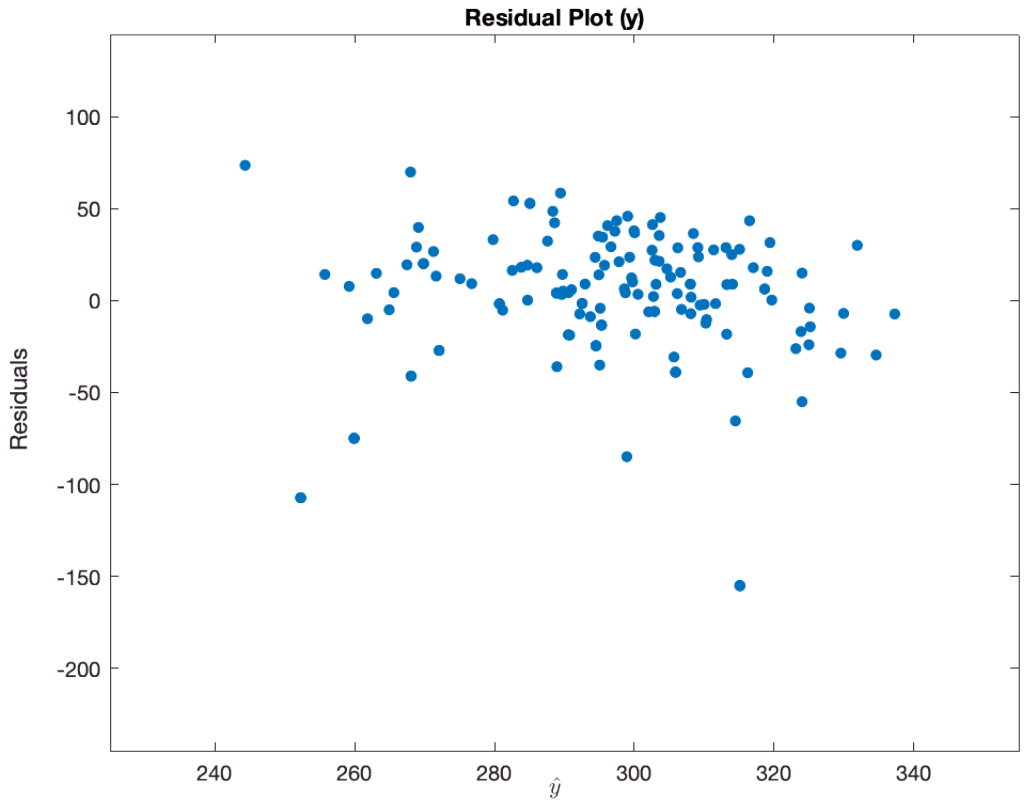



```
% Generate residual plot for Xs
figure
```

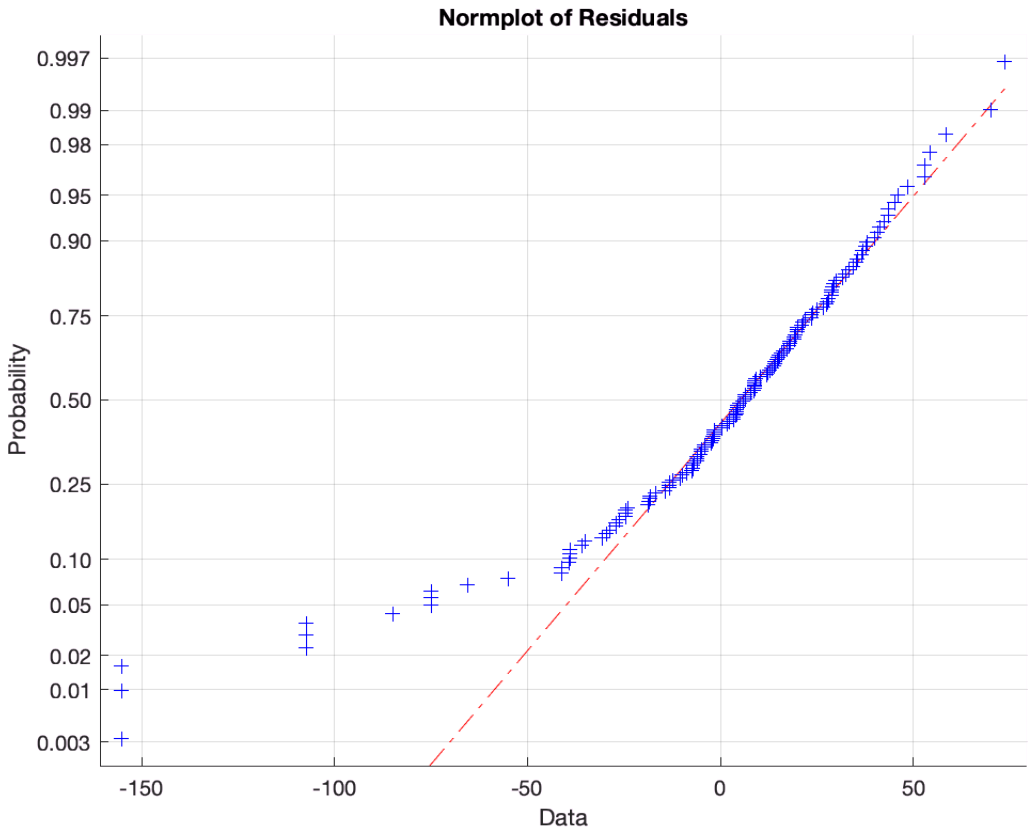
```
yhat = mdl2.Fitted;
[~,ax] = plotmatrix([bweight, snatch_max./cj_max],r2);
titles = {'Body Weight' 'Snatch Ratio'};
for i = 1:length(titles)
    title(ax(i), titles(i))
    ylabel(ax(i),'Residuals')
end
```




```
% Generate residual plot for output
figure
plotmatrix(yhat,r2)
title('Residual Plot (y)')
ylabel('Residuals')
xlabel('$$\hat{y}$$', 'Interpreter', 'Latex');
```



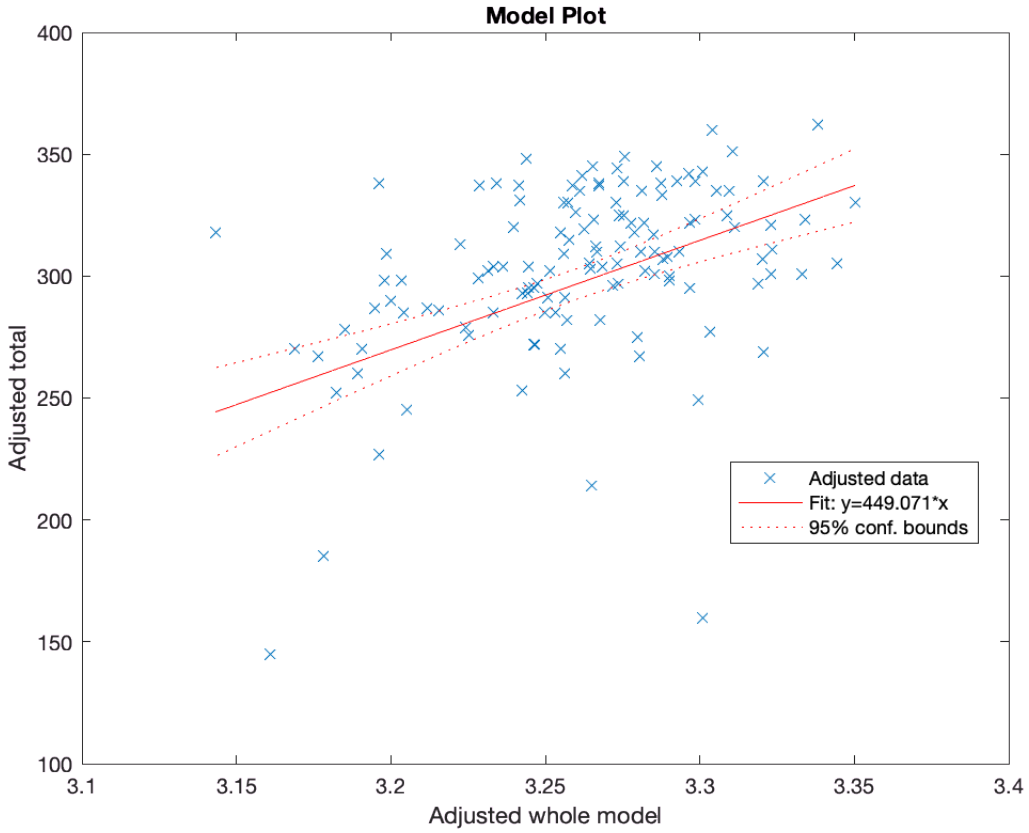

```
% Generate norm plot of residuals for analyzing
% (Helpful for identifying heavy-tail vs light-tail distributions)
figure
normplot(r2)
title('Normplot of Residuals')
```




```
figure
```

Revised Model: Plot

```
% Generate model plot (fitted line)
plot(mdl2)
title('Model Plot')
```


Model Plot
Adjusted total
Adjusted whole model
400
350
300
250
200
150
100
3.1
3.15
3.2
3.25
3.3
3.35
3.4
Adjusted data
Fit: y=449.071*x
95% conf. bounds