Group_A11_Lab2

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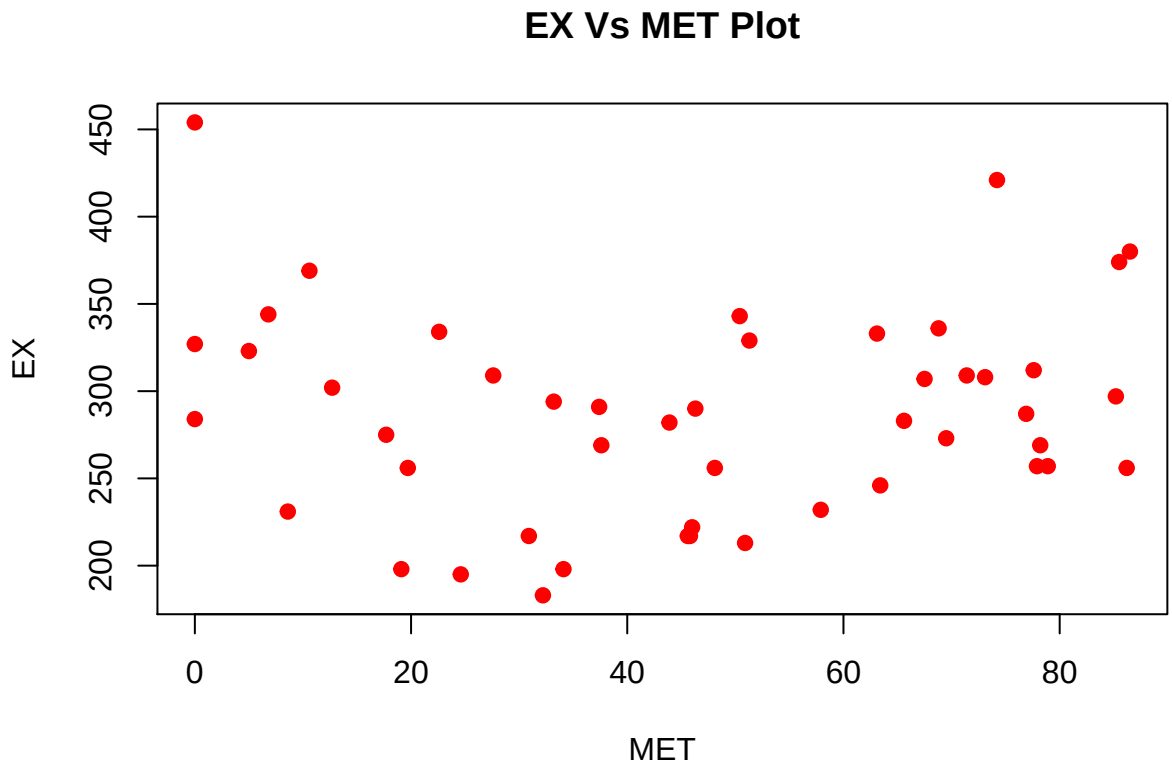
26 November 2018

Q3

Part 1

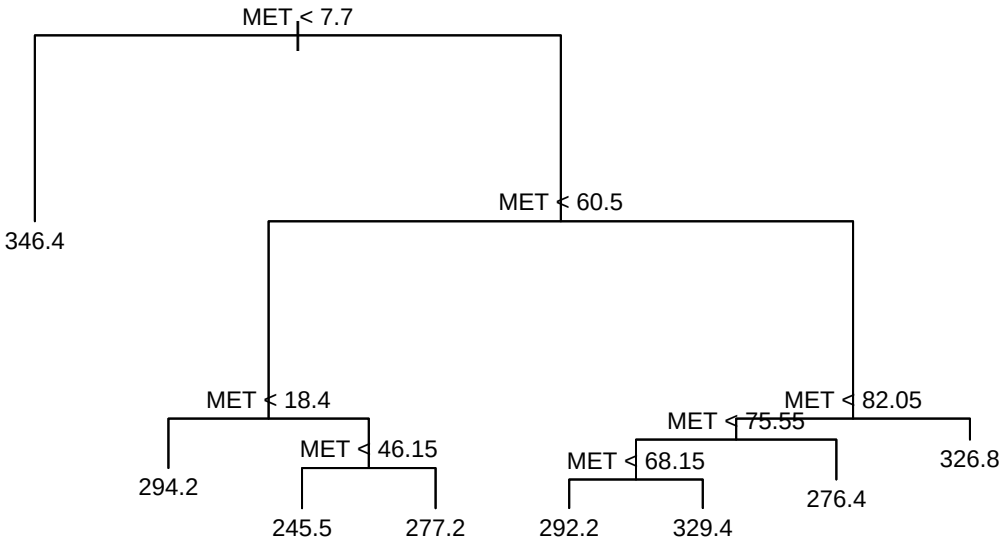


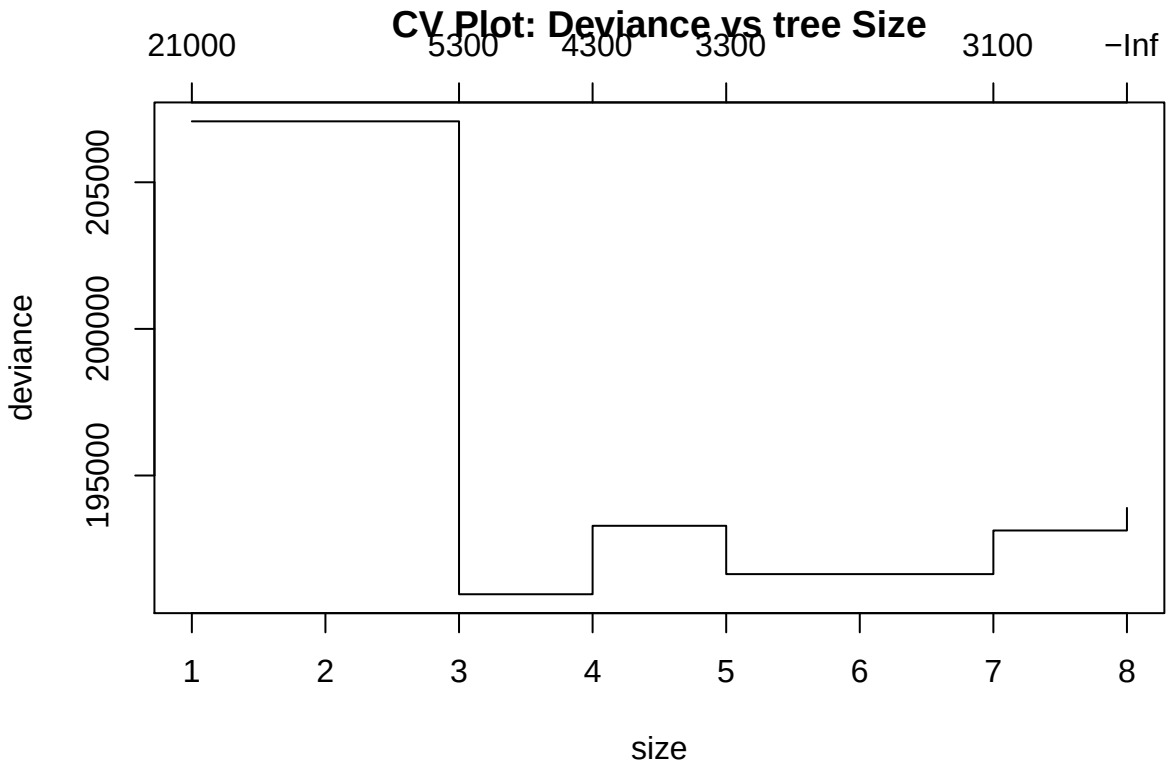
As we can see in the above plot, there is high variance among data as the data points are scattered. So linear of polynomial regression will not be a good fit to it. We think, decision trees would be good to fit for this data.

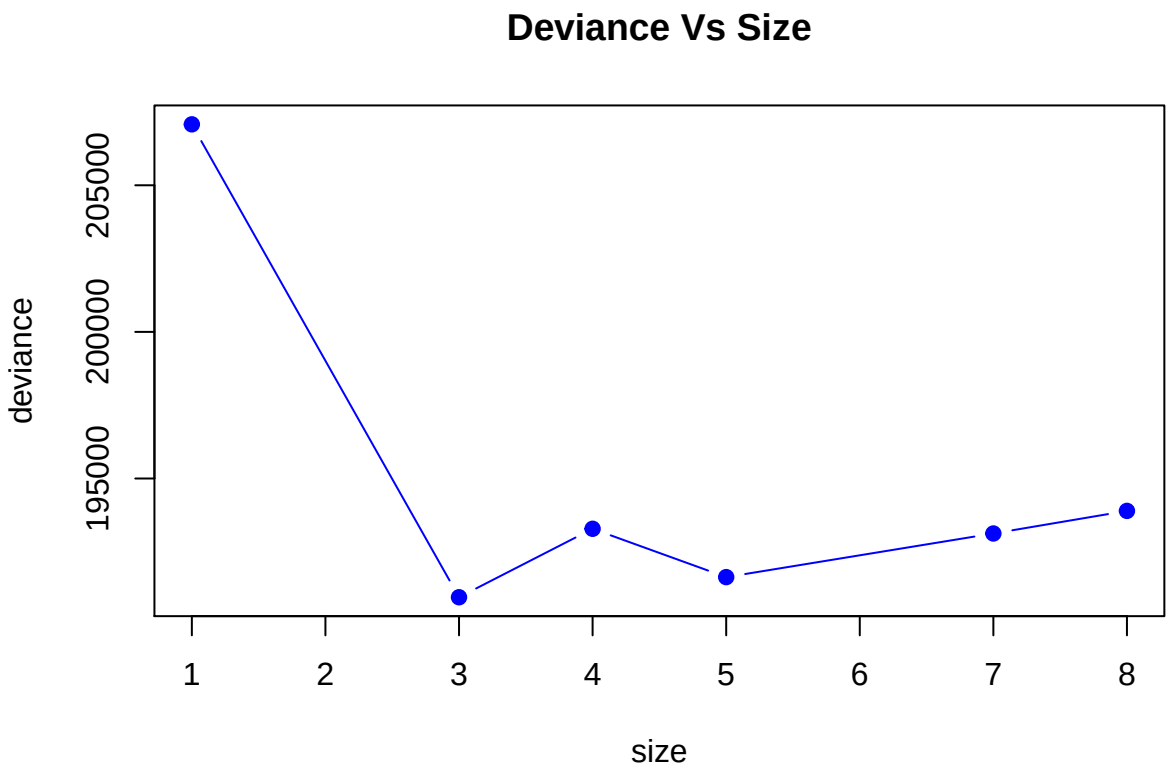
Part 2

Selection of tree using cross validation

```
##
## Fitted Tree:
```


MET < 7.7
346.4
MET < 60.5
MET < 18.4
294.2
MET < 46.15
245.5
277.2
MET < 82.05
MET < 75.55
MET < 68.15
292.2
329.4
276.4
326.8

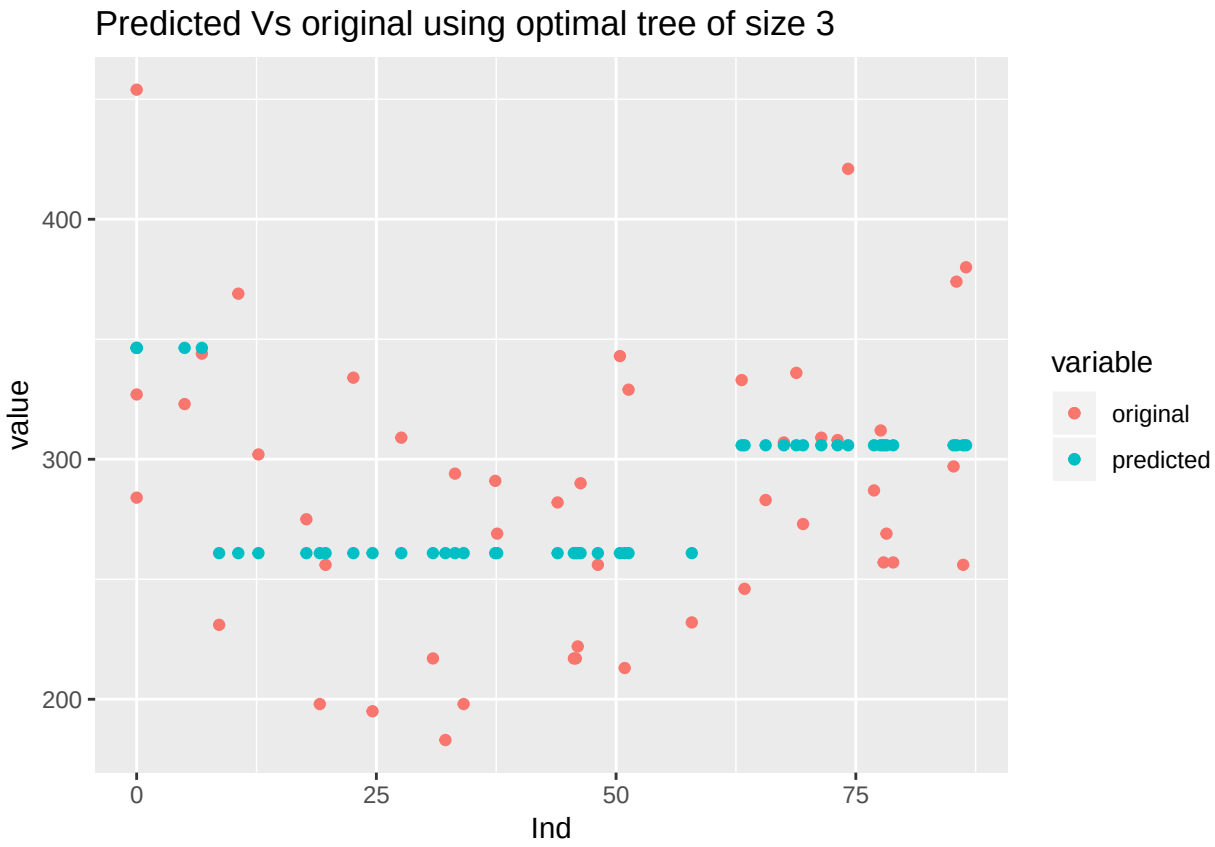

CV Plot: Deviance vs tree Size
21000
5300
4300
3300
3100
−Inf
deviance
195000
200000
205000
1
2
3
4
5
6
7
8
size



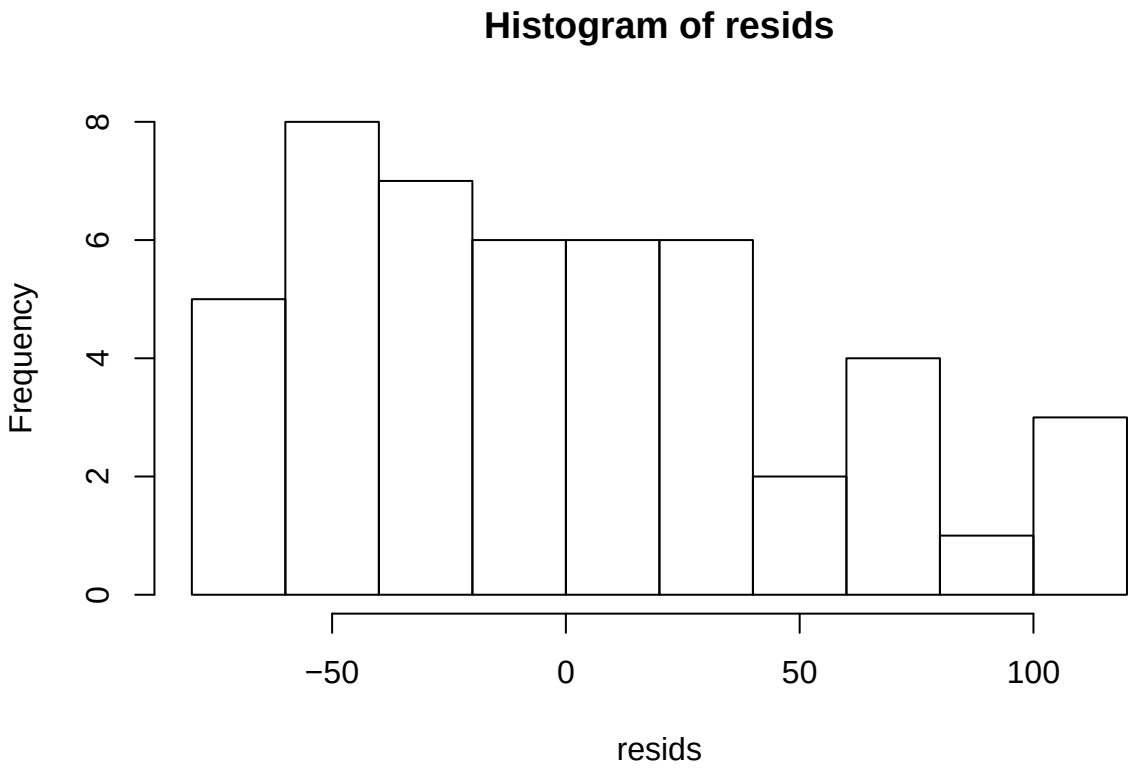

```
##
##  Optimal tree: 3
```

As see from the CV plot of deviance vs size, the least deviance(174057.6) is at 3, therefore best size is 3.

Predictions using best size


Predicted Vs original using optimal tree of size 3
value
400
300
200
0
25
50
75
Ind
variable
original
predicted

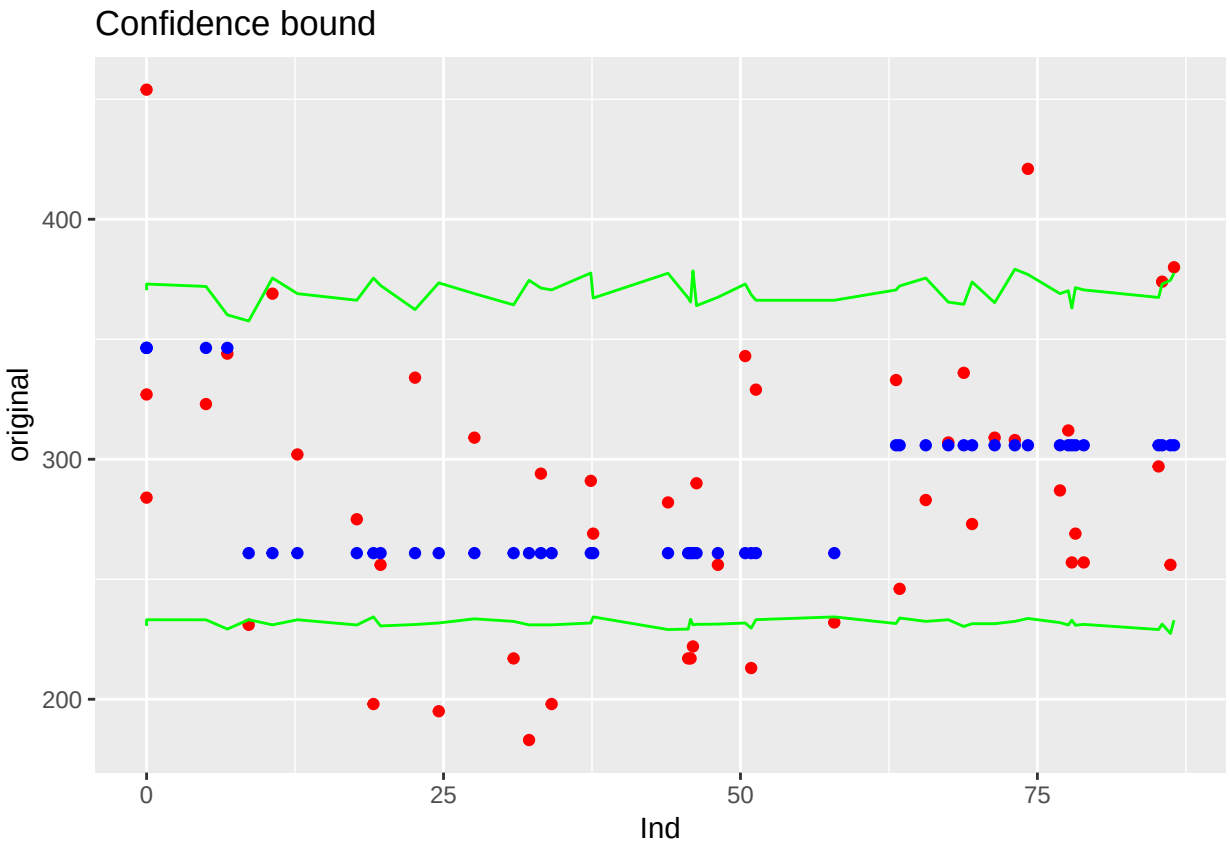
Histogramm of residuals



Residuals are not normally distributed and , in generally, models work better with more symmetrical or bell shaped distribution of residuals. This means ,in our case, fitting can be improved.

Part 3

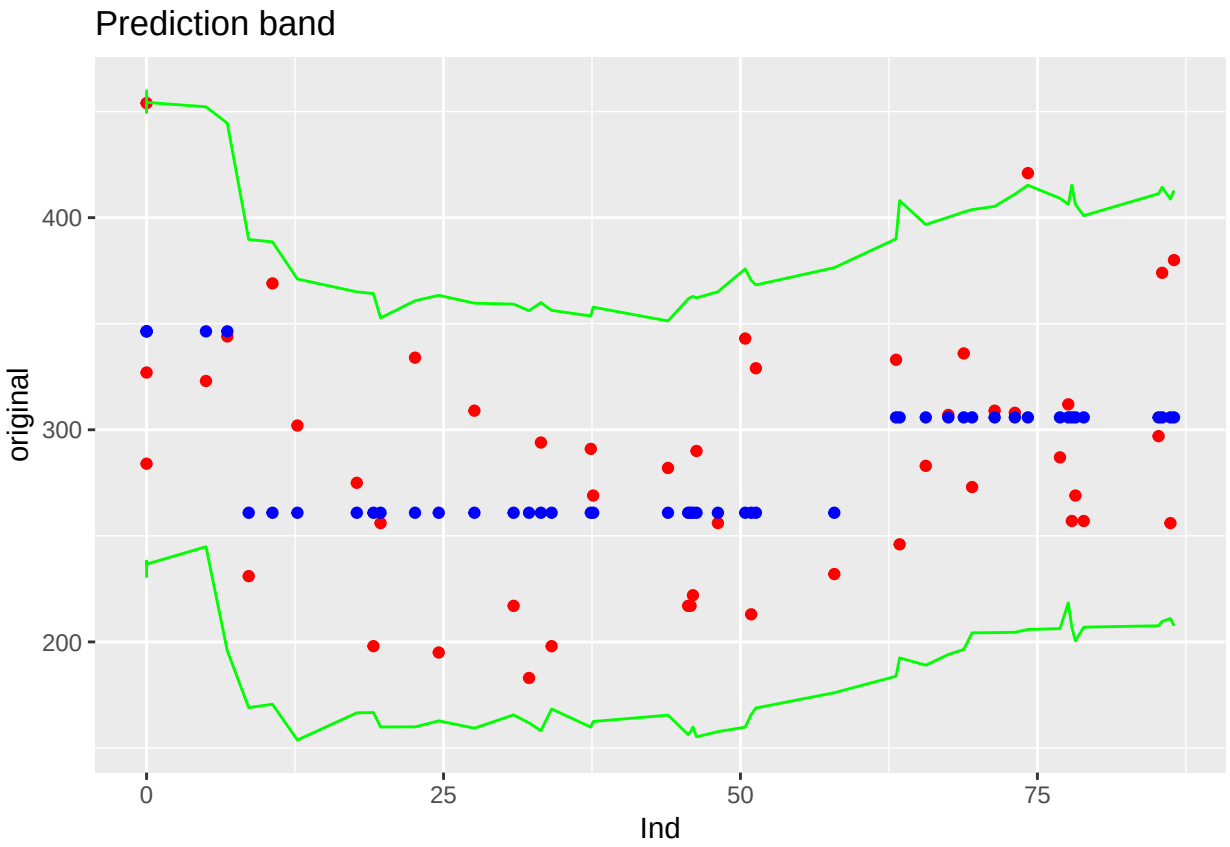
95% Confidence band (Non-Parametric)



The band is not smooth, instead it is bumpy. The reason being, it is combination of different intervals calculated for different bootstrap iterations.

Part 4

95% Confidence band (Parametric)



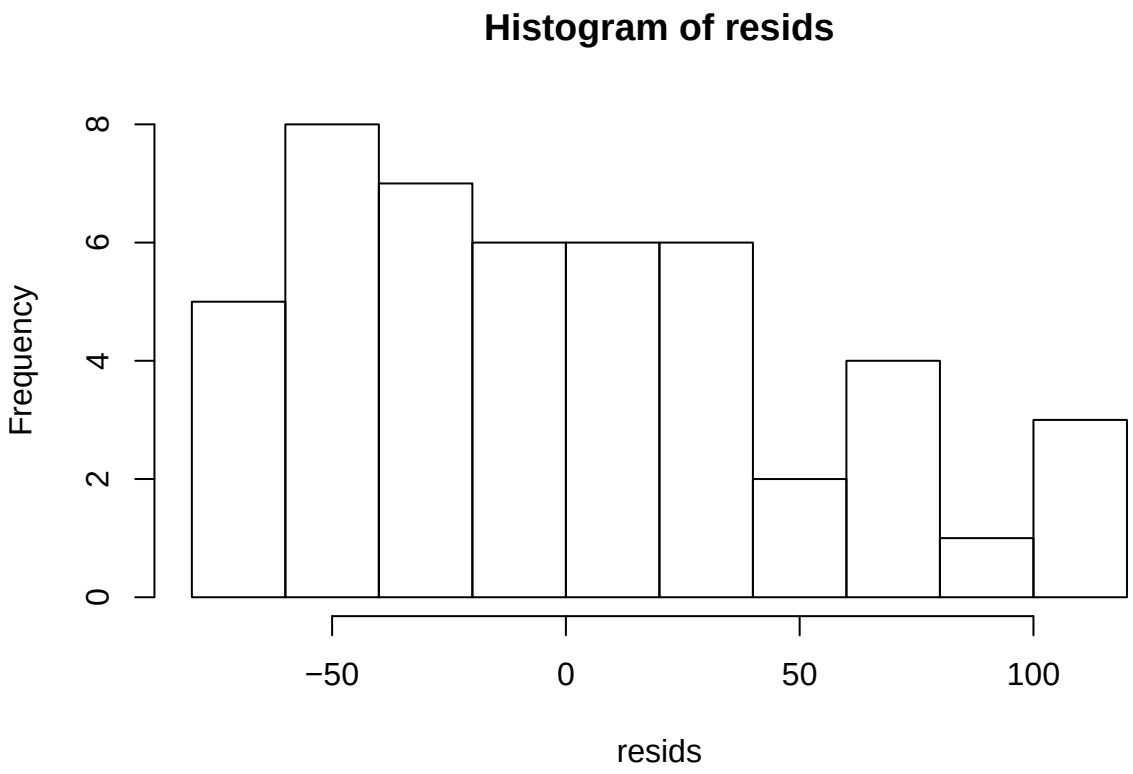
The cofidence band for parametirc bootstrap is also bumpy.

As the predctions we made in step 2 lie inside the prediction bounds therefore the model in step 2 appears reliable.

As we can see formm the plot above, the prediction band contains almost all the data except some which is almost 5%.

Part 5

Histogram of residuals



The histograms shows that, parametric booststrap is better than non-parametric bootstraping in this case. Because, as we saw in above graphs, the band for parametric bootstraping does not fit the data well.