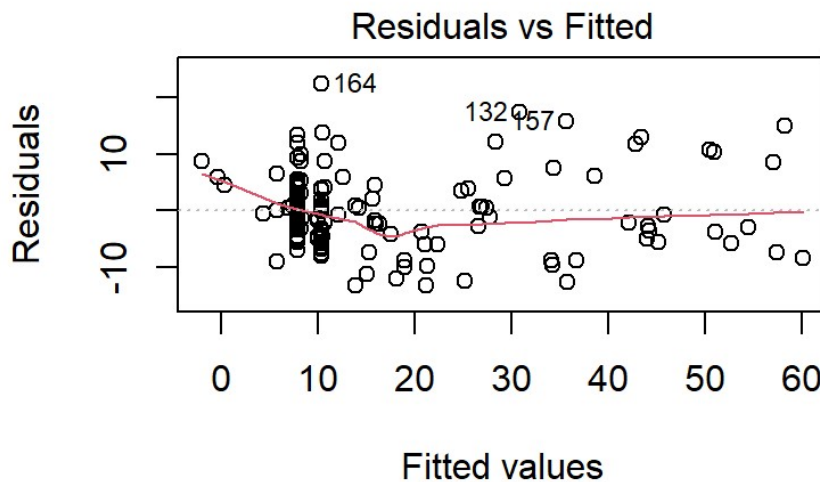
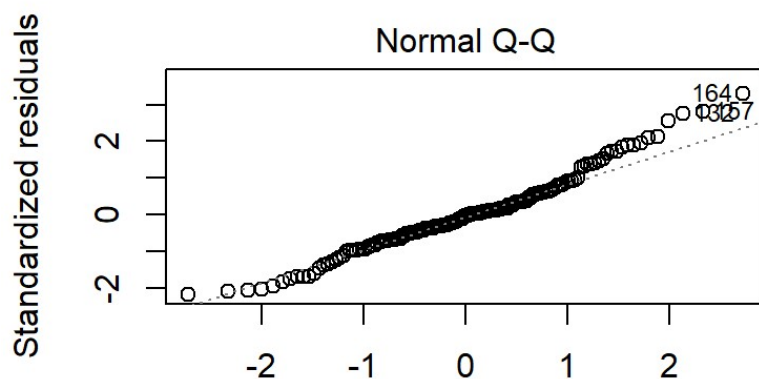


I fit a model using the multiple linear regression method with all the questions as explanatory variables for 187 observations. The response variable (the variable predicted by the model) was the average of the f1, f2, and f3 values for the subject's better ear. I determined that 16 of all the questions available should remain in the model, using significance of $\alpha = 0.05$. To ensure a valid model I randomly chose 75% (141) of the observations to build the model and the remaining 25% (46) to test the model. Also, to validate that the model generalizes well (a model that has good predictive quality), I repeated this 5 times and values for model parameters (values for the formula) were confirmed to be similar. The residuals vs fitted value plot and the normal probability plot confirm the assumptions of normality and homoscedasticity of residuals, that are required to be met for the model. The normal probability plot shows the points are close to a straight line and the fitted values vs. residuals plot show a line that is close to horizontal:



~ Q10 + Q13 + Q20 + Q21 + Q25 + Q27 + Q28 + Q35a -



Theoretical Quantiles
~ Q10 + Q13 + Q20 + Q21 + Q25 + Q27 + Q28 + Q35a -

The questions selected are:

Q10, Q13, Q20, Q21, Q25, Q27, Q28, Q35a, Q36b, Q36e, Q38, Q40, Q41, Q49b, Q50e, Q58a

This multiple linear regression equation gives the value for hearing quality (the question values are 0 or 1):

Hearing quality value = $23.7391 - 8.1490(Q10) - 13.2889(Q13) - 2.0734(Q20) + 8.7962(Q21) + 4.2515(Q25) + 6.0218(Q27) + 17.4006(Q28) + 0.3418(Q35a) + 8.4485(Q36b) - 9.8462(Q36e) - 5.1362(Q38) - 18.5258(Q40) + 12.6711(Q41) + 10.2419(Q49b) + 7.6910(Q50e) - 2.5544(Q58a)$

A hearing quality value of 25 or higher is predicted as 1 and less than 25 is predicted as 0, for a person with hearing loss and no hearing loss respectively. These are the results and the values for Accuracy, Sensitivity, and Specificity for predictions made on the 36 observations in the test data:

Actual Value			
		0	1
Prediction	0	27	1
	1	2	6

Accuracy : 0.9167

95% CI : (0.7394, 0.9689)

Sensitivity : 0.8571

Specificity : 0.9310