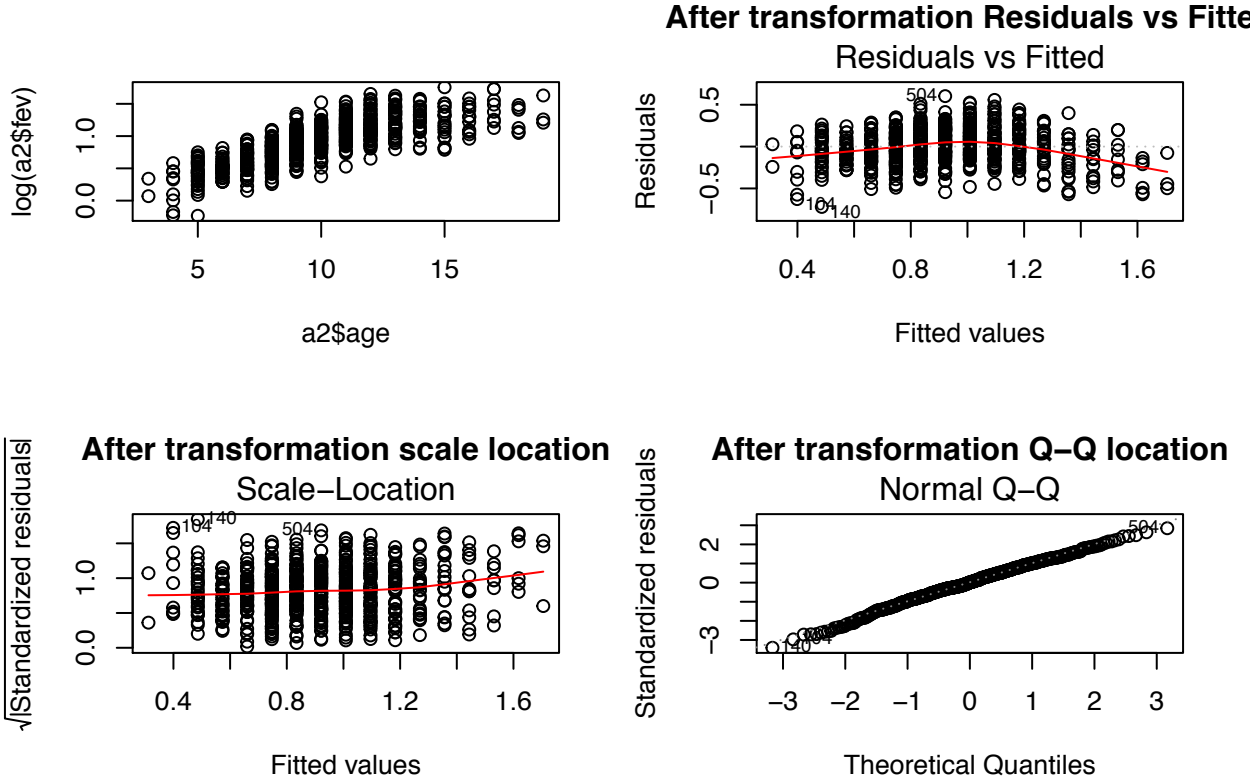
Q2: Fit a linear model with transformed FEV and examine the residual plot of the fit.

(a) Estimated model (give the form of f(y) and replace the question mark with estimates)

$$\hat{f}(Y) = 0.0506 + 0.0871 * \text{age}$$

(b)



Comments on plot: Looking at the scale-location plot the residuals appear randomly spread. So, transformation improved adherence to the constant variance assumption. This is also confirmed by residuals vs fitted line plot because the plot is spread out evenly across x-axis.Looking at the residual vs fitted plot, the residuals follow a distinctive pattern. It shows that there isn't a linear relationship. Looking at the normal Q-Q plot, residuals are lined well on the straight dashed line which indicates residuals are normally distributed. The linear model is more acceptable than the former model because two of the assumptions(except linearity) are satisfied but it's not perfect.

(c) Since slope is greater than 0,if age is increased by 1, we expect FEV to increase by 9.1 percent.

(d) 95% Confidence Interval for mean response in untransformed scale when age=c(8,17,21):

P(2.0705 < FEV < 2.1527) = 0.95,

P(4.4316 < FEV < 4.8224) = 0.95,

P(6.1482 < FEV < 6.9764) = 0.95.

95% Prediction Interval for mean response in untransformed scale when age=c(8,17,21):

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P(1.3916 < FEV < 3.2030) = 0.95,
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