Equal variance assumption for log number of reviews variable:

The equal variance assumption test for the Log Number of Reviews predictor indicates a violation of the assumption. The scatterplot of Log Love vs. Log Number of Reviews shows a random cloud pattern, suggesting relatively consistent variability of errors. However, the residual vs. predictor plot exhibits a U-shaped pattern, indicating that error variance may not be constant across all predictor values. Levene's test confirms this, with a p-value of 0.002, signifying a significant difference in variances across groups and leading to rejecting the null hypothesis. Thus, the assumption of equal variance is violated for the Log Number of Reviews, suggesting varying error variability across predictor levels.

```{r}
# SLR plot for value_price
p6 <- ggplot(data = love_lm3_aug, aes(x = log_number_of_reviews,
    y = log_love)) +
    geom_point() +
    #without CI band
    geom_smooth(method = "lm", se = FALSE) +
    ggtitle("scarlet plot Price Vs. value_price")

# plot the residuals vs the predictors
p7 <- ggplot(data = love_lm3_aug, aes(y = .resid,
    x = log_number_of_reviews)) +
    geom_point() +
    ggtitle("Residual plot against value_price")

plot_grid(p6, p7, nrow = 1)
```

Plots of log Love vs. Log Number of Reviews and plot residual vs. Log Number of Reviews
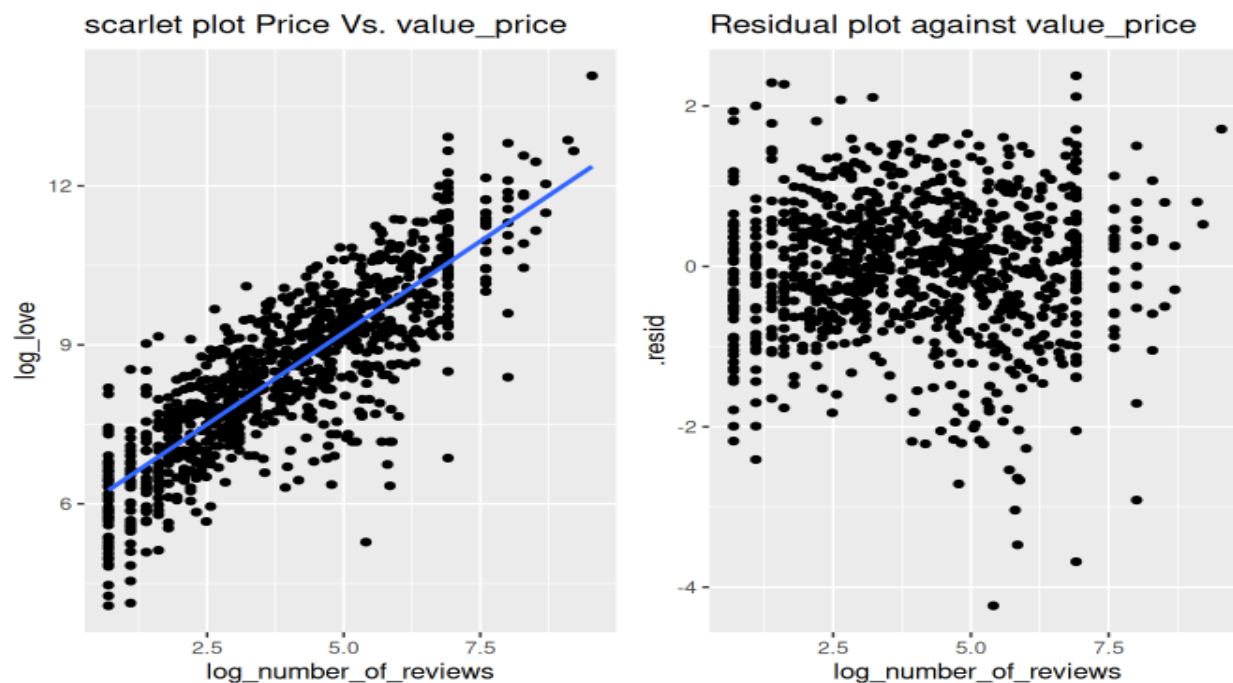
Levene's Test for Homogeneity of Variance

Ho: error variance is constant

H$_A$: error variance is not constant

```{r}
# get the median
median <- median(love_lm3_aug$log_number_of_reviews)

print(paste("median of value_price : ", median))
```
[1] "median of value_price : 3.86067430630898"

```{r}
#split the data into two groups
love_lm3_aug <- love_lm3_aug %>%
    mutate(group = factor(if_else(log_number_of_reviews < median, 1, 2)))

# Checking the number of observations are in each group
love_lm2_aug %>%
count(group)
```

```
# A tibble: 2 × 2
  group     n
  <fct> <int>
1 1       494
2 2       506
```

````{r}
# Levene's Test for Homogeneity of Variance
leveneTest(y = love_lm3_aug$.resid, group = love_lm3_aug$group) #from car
package
```
````

```
 Levene's Test for Homogeneity of Variance (center = median)
        Df F value   Pr(>F)
 group    1  10.128 0.001506 **
        998
```

Because p-value < 0.05, we reject Ho and conclude the error variance is not constant for all x

values