Equal variance assumption for rating:

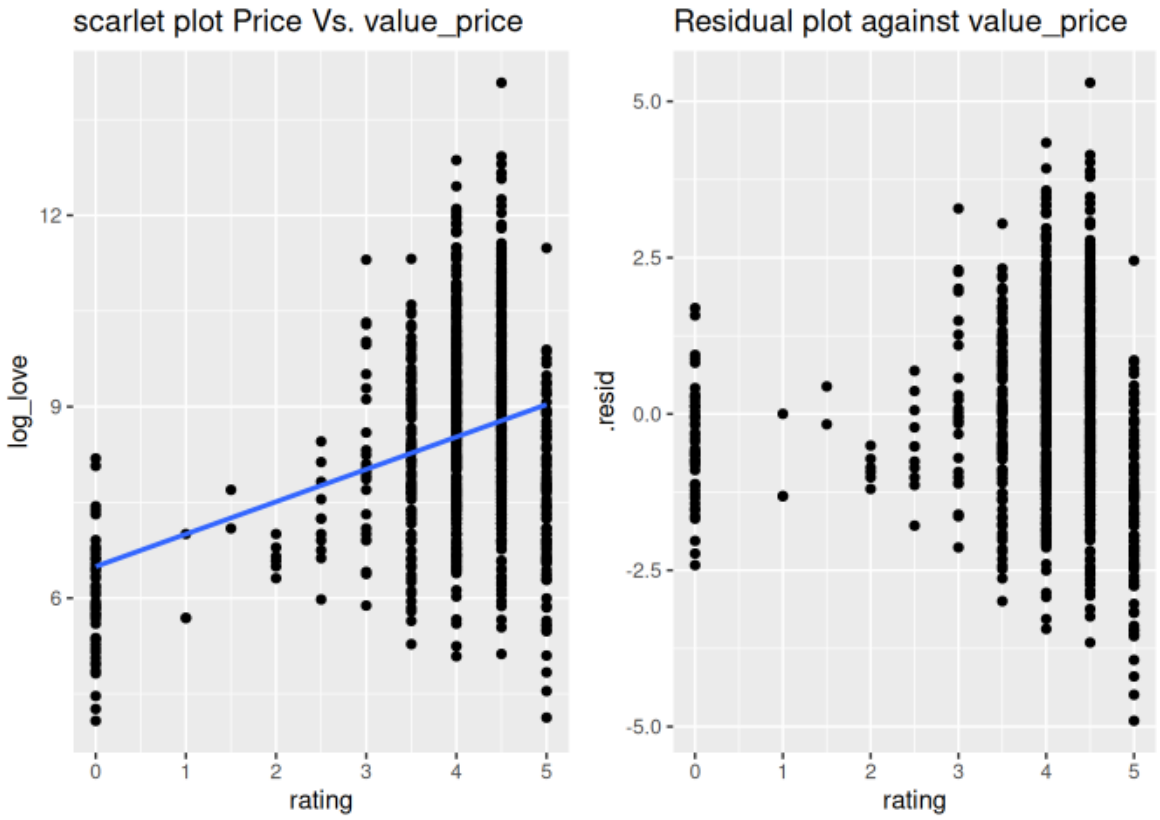
For the Rating predictor, the equal variance assumption test violates the assumption. The Log Love vs. Rating scatterplot and the residual vs. predictor plot exhibit a U-shaped pattern, indicating potential heteroscedasticity. Levene's test further confirms this observation, yielding a p-value of 5.379e-06, which is highly significant. This result suggests a substantial difference in variances across groups, leading to rejecting the null hypothesis. Therefore, the assumption of equal variance is violated for the Rating predictor, suggesting varying error variability across different predictor levels.

```{r}
# SLR plot for value_price
p6 <- ggplot(data = love_lm4_aug, aes(x = rating,
      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_lm4_aug, aes(y = .resid,
      x = rating)) +
      geom_point() +
      ggtitle("Residual plot against value_price")

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

Plot log Love vs. Rating and plot residual vs. Rating



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_lm4_aug$rating)

print(paste("median of value_price : ", median))
```

```
[1] "median of value_price : 4"
```

```{r}
#split the data into two groups
love_lm4_aug <- love_lm4_aug %>%
      mutate(group = factor(if_else(rating < 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_lm4_aug$.resid, group = love_lm4_aug$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