Model without Log value_price variable

```{r}

# Fit model without value_price

model.without.value_price <- glm(online_only ~ limited_edition + exclusive + log_price, family = binomial, data = sephora)



sum_model.without.value_price <- summary(model.without.value_price)



sum_model.without.value_price

```



```
Call:
glm(formula = online_only ~ limited_edition + exclusive + log_price,
    family = binomial, data = sephora)

Coefficients:
                 Estimate Std. Error z value Pr(>|z|)
(Intercept)      -2.06124    0.14424 -14.290  < 2e-16 ***
limited_edition1  0.81549    0.07951  10.256  < 2e-16 ***
exclusive1       -0.44571    0.06370  -6.997 2.62e-12 ***
log_price         0.24030    0.03679   6.532 6.51e-11 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 9791.0  on 8986  degrees of freedom
Residual deviance: 9592.7  on 8983  degrees of freedom
AIC: 9600.7

Number of Fisher Scoring iterations: 4
```

Likelihood ratio test without Log value_price variable

```{r}

# residual deviance for model without value_price

residual_deviance_without_value_price <- round(model.without.value_price$deviance,2)
```

```r
G <- residual_deviance_without_value_price - residual_deviance_full_model

p <- 1-pchisq(G, df = 3)
```

$H_0 : \beta_1 = 0$

$H_a : \text{at least one } \beta \neq 0$

$G = 9592.74 - 8649.08 = 943.66$

$p = 0$

The “value_price” variable is statistic significant because its p-value is close to zero

Percent change of beta

```{r}
#Percent change of beta for limited_edition

beta_change_limited_edition <- round(100 *
(model.without.value_price$coefficients[2] - model.multiv1$coefficients[2]) /
model.multiv1$coefficients[2],2)



#Percent change of beta for exclusive

beta_change_exclusive <- round(100 * (model.without.value_price$coefficients[3]
- model.multiv1$coefficients[3]) / model.multiv1$coefficients[3],2)



#Percent change of beta for price

beta_change_price <- round(100 * (model.without.value_price$coefficients[4] -
model.multiv1$coefficients[4]) / model.multiv1$coefficients[4],2)
```

$$\triangle \hat{\beta}_{limited\_edition} = 93.87$$
$$\triangle \hat{\beta}_{exclusive} = 45.7$$
$$\triangle \hat{\beta}_{price} = -126.48$$

Although value_price was dropped of the model, the value_price predictor is important confounder because it has percent changes more 15%.