HW4 - Simple Linear Regression

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```
B <- read.csv("BodySize BiteForce2.csv",header=TRUE)
head(B)
```

```
##   N MBW_KG MBF_LBS
## 1 2    132  898.98
## 2 1    182 1512.00
## 3 5     20  290.44
## 4 1     69  615.05
## 5 1    110  988.90
## 6 2     86  684.07
```

```
tail(B)
```

```
##    N MBW_KG MBF_LBS
## 18 4     20  273.13
## 19 5     30  329.78
## 20 5     18  218.28
## 21 3     59  606.06
## 22 3     13  202.32
## 23 3     22  243.23
```

```
lm1 <- lm(MBF_LBS~MBW_KG,data=B)
summary(lm1)
```

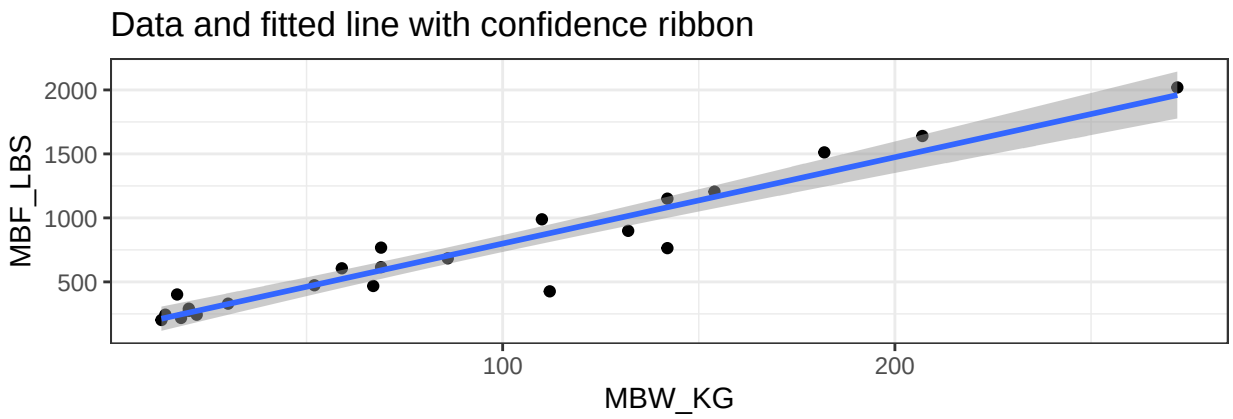
```
##
## Call:
## lm(formula = MBF_LBS ~ MBW_KG, data = B)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -454.32  -24.25   24.69   75.46  177.54
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  124.518     49.914   2.495    0.021 *
## MBW_KG         6.748      0.447  15.098 9.49e-13 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 149.1 on 21 degrees of freedom
## Multiple R-squared:  0.9156, Adjusted R-squared:  0.9116
## F-statistic: 227.9 on 1 and 21 DF,  p-value: 9.49e-13
```

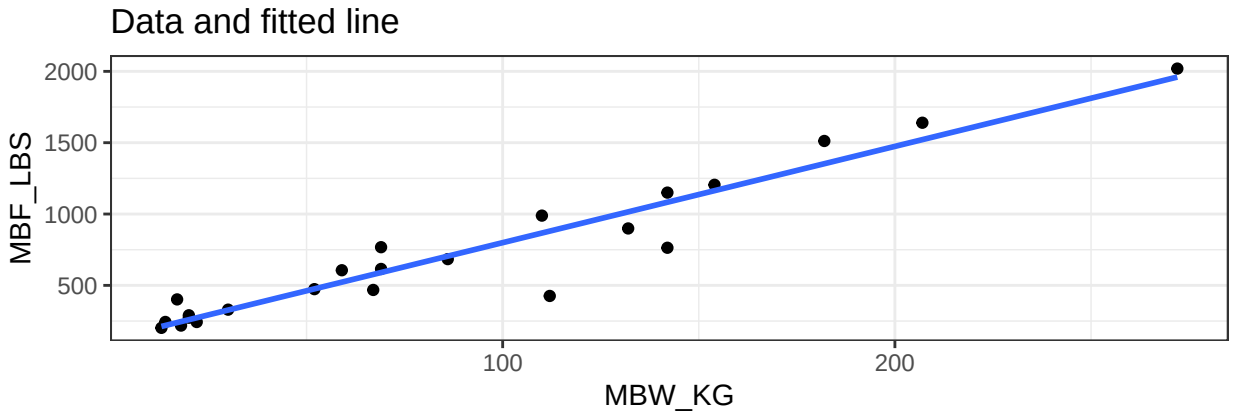
```
p1 <- ggplot(B, aes(x = MBW_KG, y = MBF_LBS) ) +
     geom_point() +
     geom_smooth(method = "lm", alpha = .5)+
     ggtitle("Data and fitted line with confidence ribbon")+
     theme_bw()
```

```
p2 <- ggplot(B, aes(x = MBW_KG, y = MBF_LBS) ) +
     geom_point() +
     geom_smooth(method = "lm", se = FALSE)+
     ggtitle("Data and fitted line")+
     theme_bw()
```

```
grid.arrange(p1,p2,nrow=2)
```

```
## `geom_smooth()` using formula 'y ~ x'
## `geom_smooth()` using formula 'y ~ x'
```



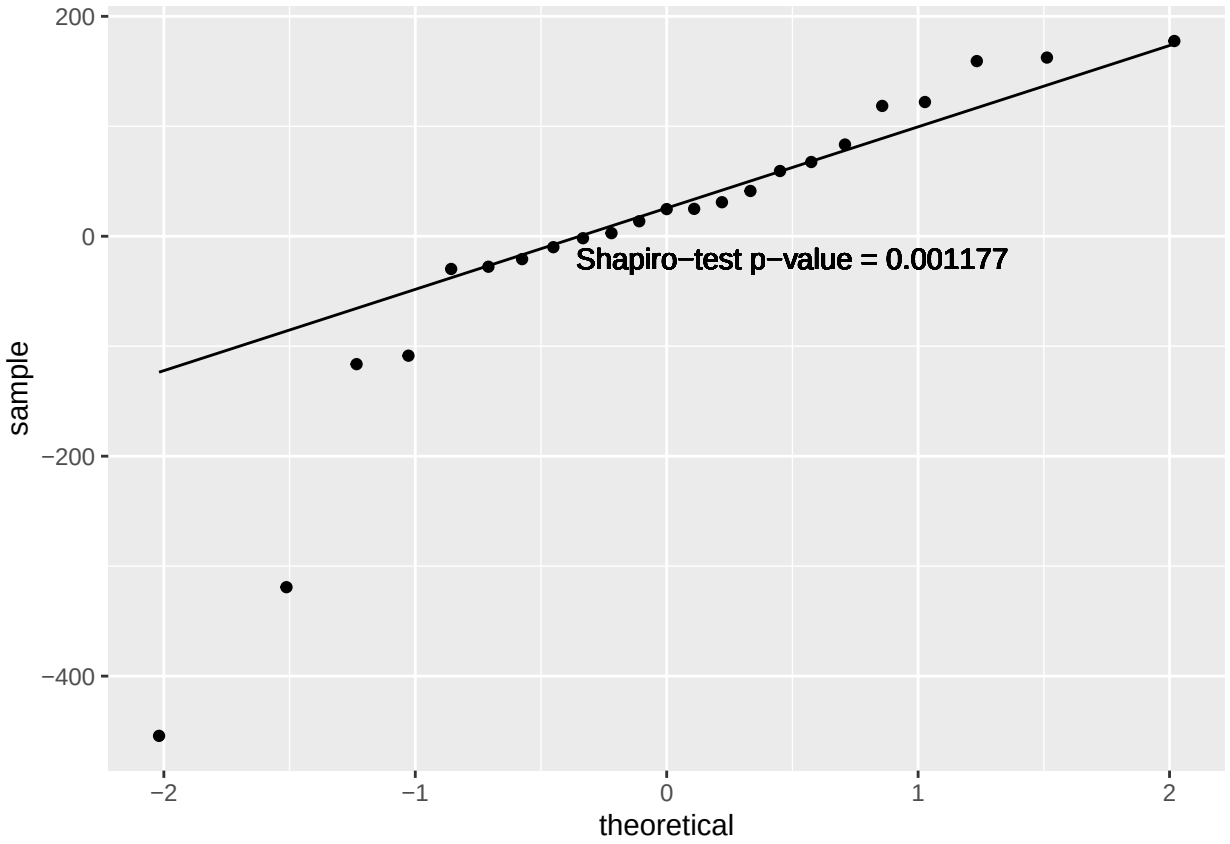



```
#qq plot with normal line (normality test)
df <- as.data.frame(lm1$residuals)
colnames(df)[1] <- "residuals"

shapiro.test(df$residuals)
```

```
##
##  Shapiro-Wilk normality test
##
## data:  df$residuals
## W = 0.82939, p-value = 0.001177
```

```
ggplot(df)+stat_qq(aes(sample=residuals)) +
  geom_qq_line(aes(sample=residuals))+
  geom_text(aes(x=0.5, y=-20, label="Shapiro-test p-value = 0.001177"))
```



There is no way for us to know if this Covariance is large or small. We need a better measure for the strength of the relationship.

```
cov(B$MBW_KG,B$MBF_LBS)
```

```
## [1] 34152.74
```