```
> mydata = read.table("CH01TA01.txt")
> x = mydata[,1]
> y = mydata[,2]
> dim(mydata)
[1] 25  2
> lm( y ~ x)

Call:
lm(formula = y ~ x)

Coefficients:
(Intercept)            x
      62.37         3.57

> output = lm (y ~ x)
> summary(output)

Call:
lm(formula = y ~ x)

Residuals:
    Min      1Q  Median      3Q     Max
-83.876 -34.088  -5.982  38.826 103.528

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   62.366     26.177   2.382   0.0259 *
x              3.570      0.347  10.290 4.45e-10 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 48.82 on 23 degrees of freedom
Multiple R-squared:  0.8215,    Adjusted R-squared:  0.8138
F-statistic: 105.9 on 1 and 23 DF,  p-value: 4.449e-10

> anova(output)
Analysis of Variance Table

Response: y
           Df Sum Sq Mean Sq F value    Pr(>F)
x          1 252378  252378  105.88 4.449e-10 ***
Residuals 23  54825    2384
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

$$T_0 = \frac{\hat{\beta}_0 - 0}{SE(\hat{\beta}_0)} = \frac{62.366}{26.177} = 2.382$$

$$T_1 = \frac{\hat{\beta}_1 - 0}{SE(\hat{\beta}_1)} = \frac{3.570}{0.347} = 10.290$$

$\sqrt{\text{Diag. of } MSE(X'X)^{-1}}$

p-value $= 2 \cdot Pr[t\text{-dist}_{(df=n-p)} > |T_0|]$
$= 2 * (1 - pt(2.382, 23))$

p-value $= 2 \cdot Pr[t\text{-dist}_{(df=n-p)} > |T_1|]$
$= 2 * (1 - pt(10.290, 23))$
$= 4.45 \times 10^{-10}$

$= \sqrt{MSE} = \sqrt{2384}$; $= n-p$

$R^2 = 0.8215$

$R^2_{adj} = 1 - \left(\frac{n-1}{n-p}\right)\frac{SSE}{SST} = 1 - \left(\frac{n-1}{n-p}\right)(1-R^2)$
$= 1 - \frac{24}{23} \times \frac{54825}{307203}$
$= 0.8137756$

$df_1 = p-1$; $n-p = df_2$

$F = 105.9 = \frac{MSR}{MSE}$
$F = T_1^2 = (10.290)^2$

p-value $= P\left[F\text{-dist}_{(df_1=1, df_2=23)} > 105.88\right]$
$= 1 - pf(105.88, 1, 23)$

$R^2 = \frac{SSR}{SST} = \frac{252378}{307203} = 0.8215$

$SSR = 252378$; $MSR = 252378$; $p-1 = 1$

$SSE = 54825$; $n-p$; $MSE = (48.82)^2 = 2384$

$SST = 252378 + 54825 = 307203 = \sum_{i=1}^{n} (y_i - \bar{y})^2$