```
> ## TABLE 7.1: Body Fat Example (pg. 257)
> mydata = read.table("http://www.ces.clemson.edu/~cspark/805/data/CH07TA01.txt")
> x1 = mydata[,1]
> x2 = mydata[,2]
> x3 = mydata[,3]
> y  = mydata[,4]
> ##  ======================================
> ##  Model : Y = b0 + b1 X1
> ##  ======================================

> LM1 = lm ( y ~ x1 )

> summary(LM1)

Call:
lm(formula = y ~ x1)

Residuals:
    Min      1Q  Median      3Q     Max
-6.1195 -2.1904  0.6735  1.9383  3.8523

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  -1.4961     3.3192  -0.451    0.658
x1            0.8572     0.1288   6.656 3.02e-06 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 2.82 on 18 degrees of freedom
Multiple R-Squared: 0.7111,     Adjusted R-squared: 0.695
F-statistic: 44.3 on 1 and 18 DF,  p-value: 3.024e-06

> anova(LM1)
Analysis of Variance Table

Response: y
          Df Sum Sq Mean Sq F value    Pr(>F)
x1         1 352.27  352.27  44.305 3.024e-06 ***
Residuals 18 143.12    7.95
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

$T_0 = \frac{\hat{\beta}_0 - 0}{SE(\hat{\beta}_0)} = \frac{-1.4961}{3.3192} = -0.451$

$T_1 = \frac{\hat{\beta}_1 - 0}{SE(\hat{\beta}_1)} = \frac{0.8572}{0.1288} = 6.655\cdots$

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

p-value $= 2 \cdot P[t(n-p) > |T_0|] = 2(1 - P(t(n-p) < |T_0|)$
$= 2(1 - pt(0.45, df = 18))$

p-value $= 2 \cdot P[t(n-p) > |T_1|]$
$= 2(1 - pt(6.656, df = 18))$

p-value is between 0 and 0.001

$= \sqrt{MSE} = \sqrt{7.95}$

$R^2_{adj} = 1 - \left(\frac{n-1}{n-p}\right)\frac{SSE}{SSTO} = 1 - \left(\frac{19}{18}\right)\frac{143.12}{495.39}$
$= 1 - \left(\frac{19}{18}\right)(1 - 0.7111)$

$F = \frac{MSR}{MSE}$

p-value $= P[F(df_1 = 1, df_2 = 18) > 44.305]$
$= 1 - pf(44.305, 1, 18)$
$= 3.5\cdots e-06$ (Rounding error)

ANOVA

$F = \frac{MSR}{MSE} = \frac{SSR}{MSE} = T_1^2 = 6.656^2 = 44.30$