Chapter 12.2

Exercise 12.9

Refer to Exercise 12.6 and assume that the assumptions about the model prevail. The estimated standard errors of $\hat{\beta}_1$, and $\hat{\beta}_2$ are .00161, and .1862, respectively.

a) Determine a 95% Confidence Interval for β_2.
To obtain a $100(1-\alpha)\%$ confidence interval for β_2, we'll use $\beta_2 \pm t_{\frac{\alpha}{2}} \frac{S}{\sqrt{S_{xx}}}$:

```
bhat2 <- -1.56
t <- StudentsT(50)
lower <- bhat2 - (quantile(t, 1 - .05 / 2) * .1862)
upper <- bhat2 + (quantile(t, 1 - .05 / 2) * .1862)
paste(lower, ', ', upper)
```

```
## [1] "-1.93399370667316 ,  -1.18600629332684"
```

b) Test H_0: $\beta_1 = .0125$ versus H_1: $\beta_1 > .0125$, with $\alpha = .05$. When testing $H_0 : \beta_1 = \beta_{10}$, the test statistic is $T = \frac{\hat{\beta_1} - \beta_{10}}{\frac{S}{\sqrt{S_{xx}}}}, d.f. = n - 2$, with a rejection region $R : T \geq t_\alpha$:

```
bhat1 <- .0156
t <- StudentsT(49)
test <- (bhat1 - .0125)/(.00161)
t_val <- quantile(t, 1 - .05)
paste('Test statistic:', test, 't_a:', t_val)
```

```
## [1] "Test statistic: 1.92546583850932 t_a: 1.67655089261685"
```

Because the test statistic (1.925) is greater than $t_{.05}$ (1.677), we reject H_0.