Exercise 1:

a) 392.36

b) -23.28

c) $SE = \sqrt{Var(\hat{\beta})} = \sqrt{\frac{\hat{\sigma}^2}{SSX}} = \frac{11.5}{\sqrt{27.07766}} = 2.21$

Confidence interval: $[-10.15, -1.49]$

d) $H_0 : \hat{\beta} = 0 \; t = \frac{\hat{\beta}}{SE} = \frac{-5.82}{2.21} = -2.63$

$p - value = P(X \leq -2.63|H_0) + P(X \geq 2.63|H_0) = 2 * 0.043 = 0.086$

We reject both 5% and 1%

e) $TS = 520.4 - 5.82 * 21.4 = 395.852$

f) The unit measure of the slope is Test Score over Class Size. This mean that for each new student in mean we have a decrease of the test score of 5.82

Exercise 2:

a) $-99.41 + 3.94 \cdot 70 = 176.39| - 99.41 + 3.94 \cdot 74 = 192.15$

b) $(-99.41 + 3.94 \cdot (x^* + 1.5)) - (-99.41 + 3.94 \cdot x^*) = 3.94 \cdot 1.5 = 5.91$

c) $SE = 0.31 \; - \; IC = \hat{\beta} \pm Z_{0.005} \cdot SE = 5.91 \pm 2.58 \cdot 0.31 = [5.1102, 6.7098]$

d) 1 $pound \rightarrow 0.45$ kg, 1 $inch \rightarrow 2.54$ cm

$weight = -99.41 \cdot 0.45 + 3.94 \cdot \frac{0.45}{2.54} \cdot height = -44.7345 + 0.7 \cdot height$
intercept = -44.7345
slope = 0.7
$\hat{\sigma} = 10.2 \cdot 0.45 = 4.59$
SE $= 0.31 \cdot \frac{0.45}{2.54} = 0.055$
$R^2 = 0.81$

e) The unit measure of slope is weight (pound) over height (inch). This mean that for each increment by 1 of the height we have an increment of weight by 3.94