Solutions for quiz 11

1. (a) $H_0 : \mu = 32$
$H_a : \mu < 32$
where
μ= the average weight of two pounders
We reject H_0 if the test statistic

$$Z = \frac{\bar{X} - \mu}{\sigma/\sqrt{n}} < -z_\alpha$$

Here μ=32, σ=3, n=16 and $z_{.04} = 1.75$, the rejection region

$$\left\{ \frac{\bar{X} - 32}{3/4} < -1.75 \right\}$$

is equivalent to

$$\left\{ \bar{X} < -1.75 \cdot \frac{3}{4} + 32 \right\} \text{ i.e., } \{\bar{X} < 30.6875\}.$$

(b) The probability β of a type II error is

$$\beta = P\left(\frac{\bar{X} - 31}{3/4} > \frac{30.6875 - 31}{3/4} \right)$$

$$= P(Z > -0.416) = 1 - P(Z < -0.416) \simeq 1 - .34 = .66$$

2.

$$\hat{\beta}_1 = \frac{S_{xy}}{S_{xx}} = \frac{cov(x,y)}{var(x)} = \frac{22.5}{6.25} = 3.6$$

$$\hat{\beta}_0 = \bar{y} - \hat{\beta}_1 \bar{x} = 158 - (3.6)(68) = -86.8$$

The least squares line is

$$\hat{y} = -86.8 + 3.6x$$