5.12 Increase sample size by four times.

5.13 $\hat{\sigma}=13, E=3, \alpha=0.01 \Rightarrow n=\dfrac{(2.58)^2(13)^2}{(3)^2}=124.99 \Rightarrow n=125$

5.16

a. $z=\frac{25.9-26}{7.6/\sqrt{50}}=-0.09 \geq -1.645=z_{0.05}$ Because the observed value of $\bar{y}$ lies less than 1.645 ($\alpha=$ 0.05) standard deviations below the hypothesized mean of 26, we fail to reject H_0 and conclude that there is not significant evidence that the mean is less than 26.

b. $\beta(24)=P\left(z \leq 1.645-\frac{|24-26|}{7.6/\sqrt{50}}\right)=P(z \leq -0.22)=0.4129$

c. $\beta(24)=P\left(z \leq 1.645-\frac{|24-26|}{7.6/\sqrt{100}}\right)=P(z \leq -0.99)=0.1611$

5.21 $H_0: \mu \leq 2$ vs $H_a: \mu > 2, \bar{y}=2.17, s=1.05, n=90$

a. $z=\dfrac{2.17-2}{1.05/\sqrt{90}}=1.54<1.645=z_{0.05} \Rightarrow$ fail to reject H_0. The data does not support the hypothesis that the mean has been decreased from 2.

b. $\beta(2.1)=P\left(z \leq 1.645-\dfrac{|2-2.1|}{1.05/\sqrt{90}}\right)=P(z \leq 0.74)=0.7704$

5.24 $n=\dfrac{(80)^2(1.645+1.96)^2}{(525-550)^2}=133.08 \Rightarrow n=134$

5.26 $H_0: \mu \geq 16$ vs $H_a: \mu < 16$

$\alpha=0.05, \beta=0.10,$ whenever $\mu \leq 12, \sigma=7.64$

$z_{0.05}=1.645, z_{0.10}=1.28, n=\dfrac{(7.64)^2(1.645+1.28)^2}{(12-16)^2}=31.2 \Rightarrow n=32$

5.29 $p-value \;=\; P(z \leq -1.08)=0.1401>0.10=\alpha$

No, there is still not significant evidence that he mean is less than 35 at the 0.10 level.

5.30 In testing $H_0: \mu=21.7$ versus $H_a: \mu \neq 21.7$,

p-value = $2P\left(z \geq \dfrac{|18.8-21.7|}{15.3/\sqrt{90}}\right)=2P(z \geq 1.80)=2(0.0359)=0.0719>0.05=\alpha$

There is not significant evidence that the mean number of Type 2 fibers is different from 21.7.