6.5 sem $= \frac{0.5}{\sqrt{40}} = 0.079$ for normal men and $\frac{0.4}{\sqrt{32}} = 0.071$ for men with chronic airflow limitation.

6.6 It means that the distribution of mean triceps skin-fold thickness from repeated samples of size 40 drawn from the population of normal men can be considered to be normal with mean μ and variance $\frac{\sigma^2}{n} \cong \frac{s^2}{n} = \frac{0.5^2}{40} = 0.0063$. A similar statement holds for men with chronic airflow limitation.

6.7 2.583

6.8 −1.313

6.9 2.365

6.10 We refer to Table 6. The lower 2.5th percentile is 0.0506 and is denoted by $\chi^2_{2,.025.}$ The upper 2.5th percentile is 7.38 and is denoted by $\chi^2_{2,.975}$.

6.11 We have that $\overline{x} = \frac{215}{25} = 8.6$ days. Therefore, a 95% confidence interval for μ is given by

$$\begin{aligned}\overline{x} \pm \frac{t_{24,\,.975}s}{\sqrt{n}} &= 8.6 \pm \frac{2.064(5.72)}{\sqrt{25}} \\ &= 8.6 \pm 2.36 = (6.24,\ 10.96)\end{aligned}$$

6.12 The 95% confidence interval is computed from $\overline{x} \pm t_{n-1,.975}\frac{s}{\sqrt{n}}$. We have that $\overline{x} = 7.84$, $s = 3.21$. There-fore, we have the following 95% confidence interval

$$\begin{aligned}7.84 \pm t_{24,.975} \times \frac{3.21}{\sqrt{25}} &= 7.84 \pm 2.064 \times \frac{3.21}{5} \\ &= 7.84 \pm 1.33 = (6.51,\ 9.17)\end{aligned}$$

6.13 A 90% confidence interval is given by

$$\begin{aligned}\overline{x} \pm t_{n-1,.95}\frac{s}{\sqrt{n}} &= 7.84 \pm t_{24,.95} \times \frac{3.21}{\sqrt{25}} \\ &= 7.84 \pm 1.711 \times \frac{3.21}{5} \\ &= 7.84 \pm 1.10 = (6.74,\ 8.94)\end{aligned}$$

6.14 The 90% confidence interval should be shorter than the 95% confidence interval, since we are requiring less confidence. This is indeed the case.

6.15 Our best estimate is given by $\hat{p} = \frac{11}{25} = .44$.

6.16 The standard error = $\sqrt{\frac{\hat{p}\hat{q}}{n}} = \sqrt{\frac{.44 \times .56}{25}} = .099$.

6.17 Since $n\hat{p}\hat{q} = 25 \times .44 \times .56 = 6.16 \geq 5$, we can use the normal theory method. Therefore, a 95% confidence interval for the percentage of males discharged from Pennsylvania hospitals is given by

$$\begin{aligned}\hat{p} \pm 1.96\sqrt{\frac{\hat{p}\hat{q}}{n}} &= .44 \pm 1.96(.099)\\ &= .44 \pm .195\\ &= (.25,\ .63)\end{aligned}$$

6.40 The best point estimate of p is $\hat{p} = \frac{20}{100} = .2$.

6.41 We can compute the 95% confidence interval for p based on the normal approximation to the binomial $(n\hat{p}\hat{q} = 16 \geq 5)$ and note if .10 falls in this interval. We have

$$\begin{aligned}c_2 &= .20 + 1.96\sqrt{\frac{.2(.8)}{100}}\\ &= .20 + 1.96\frac{(.4)}{10} = .278\\ c_1 &= .20 - 1.96\sqrt{\frac{.2(.8)}{100}}\\ &= .20 - 1.96\frac{(.4)}{10} = .122\end{aligned}$$

Since .10 is not in the interval $(.122,\ .278)$, we can be more confident that we are not observing the placebo effect.

6.42 The assumption made is that the normal approximation to the binomial distribution is reasonable here. In particular, we assume that $\hat{p} \sim N\left(p, \frac{pq}{n}\right)$. This assumption is appropriate since $n\hat{p}\hat{q} = 100(.2)(.8) = 16 \geq 5$.

6.43 The standard error $= \frac{s}{\sqrt{n}} = \frac{12}{10} = 1.2$.

6.44 We can form a 95% confidence interval of the form (c_1, c_2) based on the *t* distribution where

$$c_1 = \bar{d} + t_{n-1,.025}\frac{s}{\sqrt{n}}$$
$$c_2 = \bar{d} + t_{n-1,.975}\frac{s}{\sqrt{n}}$$

Since 99 *df* is not in our *t* tables, we approximate $t_{99,.975}$ using MINITAB as follows:

```
MTB > InvCDF .975;
SUBC>   T 99.
   0.9750   1.9842
```

Thus,

$$c_1 = 5.3 - 1.9842(1.2) = 2.9$$
$$c_2 = 5.3 + 1.9842(1.2) = 7.7$$

and we have the confidence interval $(2.9, 7.7)$.

6.45 Since the 95% confidence interval does not include 0, we can again conclude that the drug is effective using this measure of effectiveness.

6.46 The 95% confidence interval means that if a large number of samples of 100 hypertensive patients were selected and the preceding type of interval constructed, then approximately 95% of such intervals would contain the underlying mean difference in blood pressure upon using the drug.