Problem 8-20

This is just a direct lookup in the table, giving values of (a) 2.179, (b) 2.064, (c) 3.012, (d) 3.733

Problem 8-22

Since \( \sigma \) is unknown and the sample size is small, we will assume that the distribution of tire life is normal. Then, the general form of the confidence interval will be

\[
(\bar{x} - t_{\alpha/2, n-1} \frac{\sigma}{\sqrt{n}}, \bar{x} + t_{\alpha/2, n-1} \frac{\sigma}{\sqrt{n}})
\]

Here, \( \bar{x} = 60, 139.7 \), \( s = 3645.94 \), \( n = 16 \), and \( t_{0.05/2,15} = 2.131 \) since we want to construct a 95% CI. Thus, we have

\[
(60139.7 - (2.131) \frac{3645.94}{4}, \quad 60139.7 + (2.131) \frac{3645.94}{4})
\]

\[
(58,197.33, \quad 62,082.07).
\]

Problem 8-23

A one sided CI puts all of \( \alpha \) in one tail, so compute \( \bar{x} - t_{0.1}s/\sqrt{n} = 1.25 - 2.539(0.25)/\sqrt{20} \)

Problem 8-24

With the small \( n \) we need to assume the population we sampled from (microamp levels of all TV tubes of this type) is normally distributed. Without specifying otherwise, CI's are two-sided, so compute \( \bar{x} \pm t_{0.005}s/\sqrt{n} = 317.2 \pm 3.250(15.7)/\sqrt{10} \)

Problem 8-25 (b)

Since \( \sigma \) is unknown and the sample size is small, we will assume that the distribution of polyunsaturated fatty acid level is normal. Then, the general form of the confidence interval will be

\[
(\bar{x} - t_{\alpha/2, n-1} \frac{\sigma}{\sqrt{n}}, \bar{x} + t_{\alpha/2, n-1} \frac{\sigma}{\sqrt{n}})
\]

Here, \( \bar{x} = 16.98 \), \( s = 0.1017 \), \( n = 6 \), and \( t_{0.01/2,5} = 4.032 \) since we want to construct a 99% CI. Thus, we have

\[
(16.98 - (4.032) \frac{0.1017}{\sqrt{6}}, \quad 16.98 + (4.032) \frac{0.1017}{\sqrt{6}})
\]

\[
(16.81, \quad 17.15).
\]

We are 99% confident that this interval covers the true mean level of polyunsaturated fatty acid. i.e. In order to get data like this we must have sampled from a population with a mean in this range. We are right 99% of the time when we make such claims.
8.26
(a) There is nothing in this boxplot to suggest a problem with assuming we sampled from a normal distribution. We have near-perfect symmetry (more than we need to support the assumption).

(b) **One-Sample T: Comp. Strength**

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE Mean</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comp. Strength</td>
<td>12</td>
<td>2259.92</td>
<td>35.57</td>
<td>10.27</td>
<td>(2237.32, 2282.52)</td>
</tr>
</tbody>
</table>

8.27
(a) This boxplot does not show perfect symmetry, but there are no outliers or other reasons to worry much about assuming we sampled from a normal distribution.

(b) **One-Sample T: Rod Diameter**

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE Mean</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rod Diameter</td>
<td>15</td>
<td>8.23400</td>
<td>0.02530</td>
<td>0.00653</td>
<td>(8.21999, 8.24801)</td>
</tr>
</tbody>
</table>
### One-Sample T: Rod Diameter

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>SE Mean</th>
<th>Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rod Diameter</td>
<td>15</td>
<td>8.234</td>
<td>0.025</td>
<td>0.00653</td>
<td>8.2225</td>
</tr>
</tbody>
</table>

Why are they different?