Stat 345 Solutions - Section 8.3

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 σ 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

$$\begin{aligned}(60139.7 - (2.131)\frac{3645.94}{4} \quad &, \quad 60139.7 + (2.131)\frac{3645.94}{4}) \\ (58,197.33 \quad &, \quad 62,082.07).\end{aligned}$$

Problem 8-23
A one sided CI puts all of α 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 σ 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

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

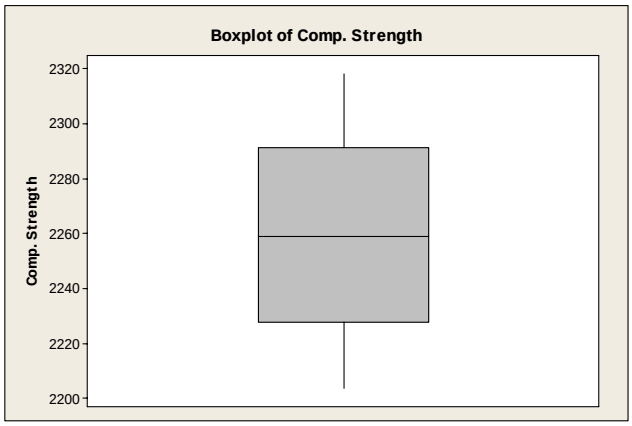
Here, $\bar{x} = 16.98$, $s = 0.1017$, $n = 6$, and $t_{0.01/2,5} = 4.032$ since we want to construct a 99% CI. Thus, we have

$$\begin{aligned}(16.98 - (4.032)\frac{0.1017}{\sqrt{6}} \quad &, \quad 16.98 + (4.032)\frac{0.1017}{\sqrt{6}}) \\ (16.81 \quad &, \quad 17.15).\end{aligned}$$

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

```
Variable         N     Mean  StDev  SE Mean         95% CI
Comp. Strength  12  2259.92  35.57    10.27  (2237.32, 2282.52)
```

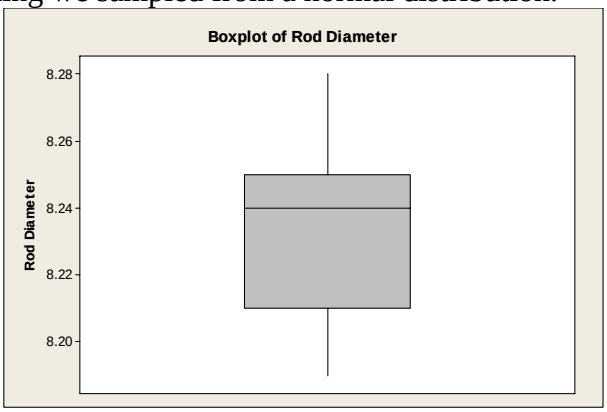
(c)

One-Sample T: Comp. Strength

```
                                                    95%
                                                  Lower
Variable         N     Mean  StDev  SE Mean      Bound
Comp. Strength  12  2259.92  35.57    10.27  2241.48
```

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

```
Variable       N     Mean    StDev  SE Mean         95% CI
Rod Diameter  15  8.23400  0.02530  0.00653  (8.21999, 8.24801)
```

8.28

One-Sample T: Rod Diameter

Variable	N	Mean	StDev	SE Mean	95% Lower Bound
Rod Diameter	15	8.23400	0.02530	0.00653	8.22250

Why are they different?