5.2

2

a

$$
\begin{aligned}
X = 73, n = 100 \\
\alpha = .05 \Rightarrow Z_{\alpha/2} = 1.96 \\
\widetilde{n} = 100 + 4 = 104 \\
\widetilde{p} = \frac{X+2}{\widetilde{n}} = \frac{75}{104} \\
\widetilde{p} \pm Z_{\alpha/2}\sqrt{\frac{\widetilde{p}(1-\widetilde{p})}{\widetilde{n}}} = .7212 \pm .08619
\end{aligned}
$$

b

$$
\begin{aligned}
X = 73, n = 100 \\
\alpha = .01 \Rightarrow Z_{\alpha/2} = 2.58 \\
\widetilde{n} = 100 + 4 = 104 \\
\widetilde{p} = \frac{X+2}{\widetilde{n}} = \frac{75}{104} \\
\widetilde{p} \pm Z_{\alpha/2}\sqrt{\frac{\widetilde{p}(1-\widetilde{p})}{\widetilde{n}}} = .7212 \pm .113
\end{aligned}
$$

c

$$
\begin{aligned}
.05 &= Z_{\alpha/2}\sqrt{\frac{\widetilde{p}(1-\widetilde{p})}{\widetilde{n}}} \\
&\Rightarrow \\
n &= \frac{\widetilde{p}(1-\widetilde{p})}{\frac{.05}{Z_{\alpha/2}}^2} - 4 \\
&= \frac{.7212(1-.7212)}{\frac{.05}{1.96}^2} - 4 \\
&= 304.97 \\
&= 305
\end{aligned}
$$

d

$$
\begin{aligned}
.05 &= Z_{\alpha/2}\sqrt{\frac{\widetilde{p}(1-\widetilde{p})}{\widetilde{n}}} \\
&\Rightarrow \\
n &= \frac{\widetilde{p}(1-\widetilde{p})}{\frac{.05}{Z_{\alpha/2}}^2} - 4 \\
&= \frac{.7212(1-.7212)}{\frac{.05}{2.58}^2} - 4 \\
&= 535.36 \\
&= 536
\end{aligned}
$$

5.3

7

For the data given it is appropriate to use the Student's t statistic to construct a 95% confidence interval for the mean shade of Mezza Perl tile. This is because as Seen in figure 1 There are no outliers. The construct the confidence interval can be seen below.

$$
\begin{aligned}
\bar{X} &= 205.127, s = 1.72, n = 9 \\
\bar{X} \pm t_{n-1,\alpha/2}\frac{s}{\sqrt{n}} &= 205.127 \pm 2.306 * \frac{1.72}{\sqrt{9}} \\
&= 205.127 \pm 1.322
\end{aligned}
$$

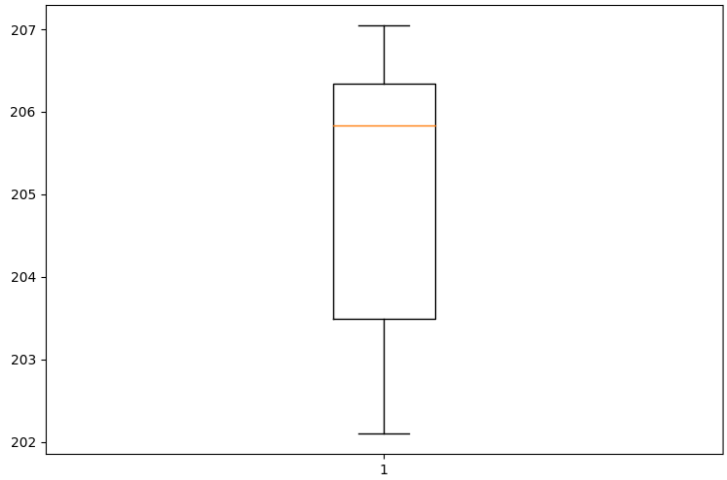

Figure 1: Box plot of the given data, Showing no outliers

8

a $\bar{X} \pm t_{n-1,\alpha/2}\frac{s}{\sqrt{n}} = 196.64 \pm 2.571 * \frac{.68}{\sqrt{6}} = 196.64 \pm 0.713$ K

b $\bar{X} \pm t_{n-1,\alpha/2}\frac{s}{\sqrt{n}} = 196.64 \pm 3.365 * \frac{.68}{\sqrt{6}} = 196.64 \pm 0.934$ K

c The confidence intervals above would not be valid as what can be seen in figure 2 there is an outlier.

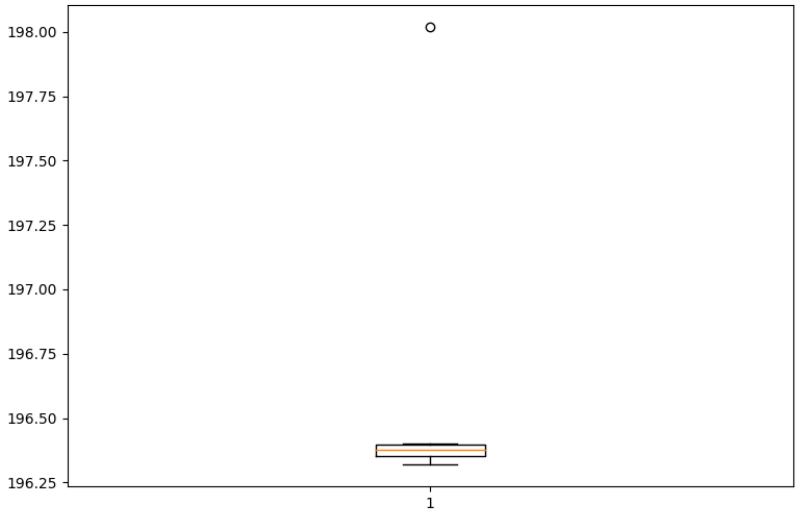

Figure 2: Box plot of the given data, Showing one outlier

problem from the lecture

For the data given in the lecture there is a CI available the box plot can be seen in figure 3. The calculation for the 95

$$\bar{X} = 196.768, s = 0.3651$$
$$\bar{X} \pm t_{n-1,\alpha/2}\frac{s}{\sqrt{n}} = 196.76 \pm 2.571 * \frac{.3651}{\sqrt{6}}$$
$$= 196.76 \pm 0.3832$$

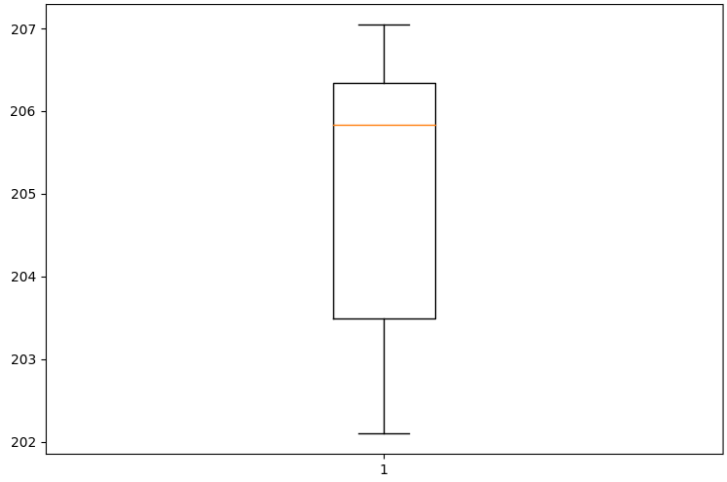

Figure 3: Box plot of the given data, Showing no outliers