

1) A process engineer is investigating the variability in tannin content of a specific craft beer using spectrophotometric techniques. (Note: tannins are chemical compounds in the polyphenol family found in a variety of foods and beverages; in beer, too much leads to astringency and can also make you feel like you want to spew.) A sample of 29 beers yielded a sample mean of 82.68 $\mu\text{g/mL}$ and a sample standard deviation of 7.809 $\mu\text{g/mL}$. Write a 95% lower confidence bound on the population standard deviation of tannin content. Include a unit with your answer.

$$\frac{(n-1)s^2}{\chi^2_{\alpha, n-1}} \leq \sigma^2$$

(+1) [one-sided lower]

(+1) [α , not $\alpha/2$]

from table: $\chi^2_{.05, 28} = \underline{41.34}$

(+2)

(+1)

$$\frac{28 \cdot 7.809^2}{41.34} < \sigma^2$$

$$41.30 < \sigma^2$$

(+1)

$$\Rightarrow \sqrt{41.30} < \sigma$$

$$6.427 < \sigma$$

(+1)

$$\left[\frac{\mu\text{g}}{\text{mL}} \right]$$

(+1)

2) A sample of 29 beers tested for tannin content yielded a sample mean of 82.68 $\mu\text{g/mL}$ and a sample standard deviation of 7.809 $\mu\text{g/mL}$. No population parameters are known. Write a 95% confidence interval on mean tannin content, and include a unit with your answer.

$$\mu = \bar{x} \pm t_{\alpha/2, n-1} \frac{s}{\sqrt{n}} \quad (+1) \text{ eqn.}$$

table: $t_{\underbrace{.025, 28}_{+2}} = 2.048 \quad (+1)$

$$\mu: 82.68 \pm 2.048 \frac{7.809}{\sqrt{29}}$$

$$79.71 < \mu < 85.65$$

(+2)

$$\left[\frac{\mu\text{g}}{\text{mL}} \right]$$

(+1)