cheg304 hw5 question 4

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we essentially want to relate our critical t at 5% to our sample mean. let's start with the definition of our t-statistic

$$t = \frac{\bar{x} - \mu}{S/\sqrt{N}}$$

which rearranges to

$$\bar{x} = \frac{tS}{\sqrt{N}} + \mu$$

now we can get this t value for $\nu = 39$ and $\alpha = 0.05$ even though we haven't mentioned alpha... it's alpha. let's calculate

```
from scipy.stats import t, chi2
import numpy as np

tval = t.ppf(0.05, 39)
print(f't value: {tval:.4f}')

xbar = (tval * (0.05) / np.sqrt(40)) + 6.00
print(f'xbar: {xbar:.3f}')
```

```
t value: -1.6849
xbar: 5.987
```

and i kept the 4 s.f. to make enszer happy.

b.

for this one we need to transform our standard deviation into C, which will follow the chi-squared distribution. we need to assume the underlying distribution is normal.

$$C = \frac{(n-1)S^2}{\sigma^2}$$

$$S = \sqrt{\frac{C\sigma^2}{n-1}}$$

now we just find our 2.5% χ^2 statistic and slap it in there for our final result

```
C = chi2.ppf(1-0.025,19)
print(f'critical C: {C:.4f}')
S = np.sqrt((C * (0.05**2)) / (19))
print(f'critical S: {S:.4f}')
```

```
critical C: 32.8523
critical S: 0.0657
```

```
# some filler text
```