1. (10 points) In Chapter 7 we discussed confidence intervals for population standard deviation and variance. Here is a $100(1-\alpha)\%$ CI for the population standard deviation σ.

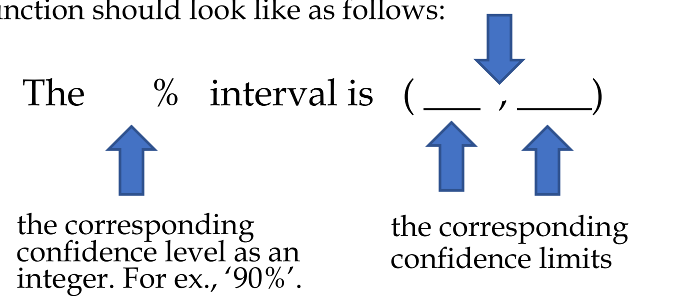
$$\sqrt{\frac{(n-1)S^2}{\chi^2_{\alpha/2,n-1}}} < \sigma < \sqrt{\frac{(n-1)S^2}{\chi^2_{1-\alpha/2,n-1}}}$$

where $\chi^2_{\alpha/2,n-1}$ and $\chi^2_{1-\alpha/2,n-1}$ are the critical values of the chi-squared distribution with degrees of freedom $n-1$ (n is the sample size). So, $\alpha/2$ and $1-\alpha/2$ are the areas to the right of the critical values.
Write a function that finds two-sided confidence interval for the population standard deviation. The name of the function is up to you. The arguments of the function should be

data = a numeric vector, conf.level = a confidence level.

Round the confidence limits to four decimal places.
The output of the function should look like as follows:

This is a comma



For example,

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The 95% interval is (3.5094,4.6432)
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2. (10 points) The article **"Concrete Pressure on Formwork" (*Mag. of Concrete Res.*, 2009: 407–417)** gave the following observations on maximum concrete pressure:

33.2	41.8	37.3	40.2	36.7	39.1	36.2	41.8
36.0	35.2	36.7	38.9	35.8	35.2	40.1	

The dataset can be found in the file **pressure.xlsx.**

a. Construct a normal plot (qq plot). Label the axes and add the title to the graph. Is it plausible that this sample comes from a normal distribution? Add your answer as a comment.

b. Using the function from problem 1, calculate a two-sided confidence interval for the population standard deviation of maximum pressure with confidence level 95%.

3. (10 points)
   a. Modify the function in problem 1, so it calculates a CI without printing the result.
   b. Generate 100 random samples of size 15 (each) from the normal distribution with the following parameters: $\mu = 35, \sigma = 3$.

c. For each of the 100 samples, find a 95% confidence interval for σ.
d. Use R to find the number of the confidence intervals that contain $\sigma = 3$.
e. Display your result as follows

$$The\ number\ of\ 95\%\ CIs\ that\ contain\ sigma = 3\ is\ (a\ number\ from\ d.)$$

Is your result close to the confidence level?