

EcObUdDiEs group

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**Q1 (1 pt.): Calculate the critical z-values for a 90% CI of the standard normal distribution (not a 95% interval). Show the R-code you used to perform the calculation.**

```
qnorm(c(0.05, 0.95))  
-1.644854 1.644854
```

**Q2 (1 pt.): Consult the help entry for `qt()` and calculate the critical values for  $df = 10$ . Show the R-code you used to perform the calculation.**

```
qt(p=c(0.025, 0.975), df = 10)  
[1] -2.228139 2.228139
```

**Q3 (2 pts.): How many degrees of freedom are required for the 0.025% lower critical value of a t-distribution to match the 0.025% lower critical z-value (from the standard normal) to within one decimal place? Show the R-code you used to perform the calculation.**

```
qnorm(c(0.025, 0.975))  
qt(p = c(0.025, 0.975), df = 65)  
[1] -1.997138 1.997138  
65
```

We guessed and tested different  $df$  values to get close 1.9 to the critical z-value from the `qnorm` function above.

**Q4 (1 pt.): How many degrees of freedom are required for the 0.025% lower critical value of a t-distribution to match the 0.025% lower critical z-value (from the standard normal) to within two decimal places? Show the R-code you used to perform the calculation.**

```
qt(p = c(0.025, 0.975), df = 100000)  
[1] -1.959988 1.959988
```

We guessed and tested different  $df$  values to get close 1.95 to the critical z-value from the `qnorm` function above.

**Q5 (2 pts.):** What are the critical t-values you would need to know to construct a 95% CI on the mean? Recall the general procedure for constructing a CI? Check out the last section of slide deck 5 if you need a refresher.

**Suppose you know that the sample standard deviation for a group of 50 measurements is 3.14. The mean value is 10.0.**

To construct a 95% CI on the mean, you would need to know alpha (which would be 0.05 for a 95% CI.) You also need the degrees of freedom which is (n-1), in this example the degrees of freedom would be 49.

**Q6 (3 pts.):** Construct the interval. Show the R-code you used to perform the calculation.

```
tval = qt(p = c(0.025, 0.975), df = 49)
```

```
sse_50 = 3.14 / sqrt(50)
```

```
Clrad = tval * sse_50
```

```
print(Clrad)
```

```
CI = 10 + Clrad
```

```
print(CI)
```

```
CI is 9.107622 10.892378
```