

Lab 7

confidence intervals

What is a confidence interval?

Our goal is to learn something about a desired but unknown population parameter.

- A **confidence interval** is a range that is computed using sample statistics to estimate an unknown interval for the parameter.

| Population Parameter | |
|-------------------------------|----------|
| Population mean | μ |
| Population standard deviation | σ |
| Population proportion | P |
| Population size | N |
| Population data value | X |
| Correlation coefficient | r |

How to find the confidence interval

cv <- critical value

stat <- sample statistics

s <- sample SD

SE <- standard error

$$SE = \frac{s}{\sqrt{n}}$$

$$CI = stat - / + (cv * SE)$$

Finding a confidence interval in R

```
samp <- sample(df, n)
```

```
sample_mean <- mean(samp)
```

```
se <- sd(samp) / sqrt(n)
```

```
cv <- qnorm(0.025)
```

```
lower <- sample_mean - cv * se
```

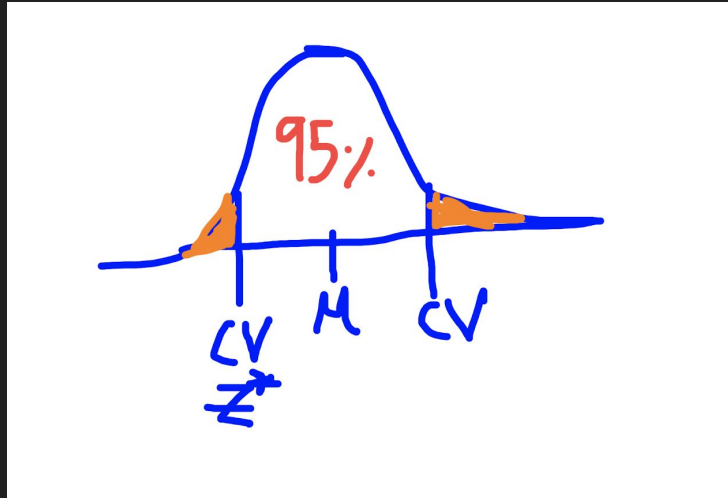
```
upper <- sample_mean + cv * se
```

```
c(lower, upper)
```

Finding the critical values in R

```
Alpha <- (1-(CI%/100)) / 2
```

```
cv<-qnorm(Alpha, lower.tail = F)
```



Interpreting confidence intervals

We are 95% confident that the true population parameter will be in the interval lower bound - upper bound (“We’re 95% confident that the interval captured the true parameter value.”)

Caution: This is very **different** from saying that there is 95% chance that the true mean is in the interval

More about CI

The Increasing % of the confidence will result in a wider interval. Because of a larger margin of error

If we construct 100 95% confidence intervals then the true population parameter will be captured in about 95 of our intervals (see the [“What does “95% confidence” mean”](#) section of lab)