Confidence Interval for a Mean

```
> ### Descriptive Statistics

> length(Outcome)

[1] 8

> mean(Outcome)

[1] 4

> sd(Outcome)

[1] 3.116775

> ### Inferential Statistics

> t.test(Outcome)$conf.int

[1] 1.394311 6.605689
attr(,"conf.level")
[1] 0.95
```

These values are produced by the "Descriptives" commands. See the earlier annotated output for details of how these are computed from frequency distributions.

The Standard Error of the Mean ("SE") provides an estimate of how spread out the distribution of all possible random sample means would be. Here it's calculated as:

$$SE_M = \frac{SD}{\sqrt{N}} = \frac{3.117}{\sqrt{8}} = 1.102$$

This provides a confidence interval around (centered on) the Mean ("M"). Calculation requires the appropriate critical value. Specifically, the *t* statistic (with 7 *df*) that has a probability of .05 equals 2.365. As a result:

$$CI_M = M \pm (t_{CRITICAL})(SE_M) = 4.000 \pm (2.365)(1.102)$$

Thus, the researcher estimates that the true population mean is somewhere between 1.394 and 6.606 (knowing that the estimate could be incorrect).