When the sample size is two, a 50% confidence interval is defined by the two values

Eamonn O'Brien

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1 Sample two realisations from a normally distributed population

```
alpha <- 0.5              # 50% confidence

n <- 2                    # sample size
mu <- 0                   # population mean
sigma <- 1                # population standard deviation

x <- rnorm(n, mu, sigma) # generate the sample

sort(x)
```

```
[1] -1.2645712  0.7863495
```

2 Calculate the confidence interval

```
error <- qt(1-alpha/2, df=n-1)*sd(x)/sqrt(n)
mean(x) + c(-1, +1) * error
```

```
[1] -1.2645712  0.7863495
```

3 Calculate again using one sample t-test function

```
t.test(x, conf.level = alpha)
```

```
    One Sample t-test

data:  x
t = -0.23317, df = 1, p-value = 0.8542
alternative hypothesis: true mean is not equal to 0
50 percent confidence interval:
 -1.2645712  0.7863495
sample estimates:
 mean of x
-0.2391109
```

4 References

https://github.com/eamonn2014/programs/blob/master/50%20confidence%20interval.Rmd

5 Computing Environment

```
R version 3.2.2 (2015-08-14)
Platform: x86_64-w64-mingw32/x64 (64-bit)
Running under: Windows 8 x64 (build 9200)

locale:
[1] LC_COLLATE=English_United Kingdom.1252
[2] LC_CTYPE=English_United Kingdom.1252
[3] LC_MONETARY=English_United Kingdom.1252
[4] LC_NUMERIC=C
[5] LC_TIME=English_United Kingdom.1252

attached base packages:
[1] stats     graphics  grDevices utils     datasets  methods
[7] base

other attached packages:
[1] knitr_1.13

loaded via a namespace (and not attached):
 [1] magrittr_1.5    formatR_1.4     tools_3.2.2     htmltools_0.3.5
 [5] yaml_2.1.13     Rcpp_0.12.6     stringi_1.1.1   rmarkdown_1.0
 [9] stringr_1.0.0   digest_0.6.9    evaluate_0.9


[1] "~/X/"
```

This took 0.24 seconds to execute.