Review of Intro Stat

TadamasaSawada, Mher Movsisyan

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Q1. Standard Error

(Q1a) The standard deviation represents width of the population. It can be estimated from samples taken from the distribution. The standard error can be also estimated from these samples.

The script (Q1a) estimates the standard deviation of the population from 1000 samples taken from the population. Revise the script so that it computes the standard error from "samples".

(Q1b) Consider a session of taking N samples from the population and computing an average of these samples. If you repeat this sessin for M times, there will be M computed averages from the sessions and these computed average will form a new distribution that is different from the population. The standard error represents width of this distribution of the computed averages. Namely, the standard error that is estimated from samples from the population (Q1a) is the standard deviation of the distribution of the computed averages.

The script (Q1b) run 1000 sessions of taking 1000 samples from the population and computing an average of these samples (computed_averages). Revise the script so that it computes the standard error from "computed_averages".

Note that the standard errors estimated in (Q1a) and (Q1b) should be close to one another but will be unlikely identical.

(Q1a) Standard Error (SE) estimated from data in a single session

```
true_std = 100

nSamples = 1000
samples = rnorm(nSamples, sd=true_std)
#sd(samples) # Standard Deviation

## Compute SE from "samples"
sd = sqrt(sum((mean(samples) - samples)**2)/(nSamples - 1))
sd
```

```
## [1] 102.8654
```

(Q1b) Standard Error (SE) estimated from data in multiple sessions

```
true_std = 100
nSessions = 1000

nSamples = 1000
computed_averages = rep(0,nSessions)
for(s in 1:nSessions)
{
```

```
  samples = rnorm(nSamples, sd=true_std)
  computed_averages[s]= mean(samples)
}

## Compute SE from "computed_averages"
sd = sqrt(sum((mean(computed_averages) - computed_averages)**2)/(nSessions - 1))
sd
```

```
## [1] 3.226744
```