To test the efficacy of a new cholesterol-lowering medication, 10 people are selected at random. Each has their LDL levels measured (shown below as Before), then take the medicine for 10 weeks, and then has their LDL levels measured again (After).

Subject Before After

Subject	Before	After
1	132	114
2	174	175
3	147	140
4	179	152
5	122	100
6	192	158
7	125	98
8	119	93
9	200	191
10	173	139

Give a 93.1% confidence interval for $\mu_B - \mu_A$, the difference between LDL levels before and after taking the medication.

Confidence Interval = at 93.1% confidence.

Give your answer as an open interval, in the form (A,B) where A is the lower bound and B is the upper bound.

Solution

This is a "paired t-test", so we need to take the difference between the columns Before and After:

Subject   Difference

Subject	Difference
1	18
2	-1
3	7
4	27
5	22
6	34
7	27
8	26
9	9
10	34

Next, we find the mean and standard deviation of the "differences" column:

$$\bar{x} = \frac{18 - 1 + 7 + 27 + 22 + 34 + 27 + 26 + 9 + 34}{10} = 20.3$$

$$s = 11.85$$

$$n = 10$$

93.1% with 9 d.f. has $t = 2.064$.

$$CI = 20.3 \pm \frac{(2.064)(11.85)}{\sqrt{10}}$$

$$CI = (12.566;\ 28.034).$$