Task i In the city five babies were born per day with following weight: 2.8 kg, 3.4 kg, 3.2 kg, 3.2 kg, 2.9 Find the confidence intervals of babies' weight with kg.probability 0.95.

**Solution**

Since the population standard deviation is not known, one cannot use normal distribution to construct the confidence interval. Since the sample is small, one should assume normality of the population in order to use Student's $t$-distribution.

Data summary:

$\bar{x} = 3.1$; $s = 0.245$

Significance level: $\alpha = 1 - 0.95 = 0.05$

Degrees of freedom: $df = n - 1 = 4$

The critical value of $t_{\frac{\alpha}{2}}$ can be determined from the $t$-distribution table or calculated using the technology (function T.INV.2T() of MS Excel).

For $df = 4$ and $\alpha = 0.05$, $t_{\frac{\alpha}{2}} = 2.776$.

The margin of error is calculated as follows.

$$E = t_{\frac{\alpha}{2}} \frac{s}{\sqrt{n}} = 2.776 \times \frac{0.245}{\sqrt{5}} = 0.3$$

Lower endpoint = $\bar{x} - E = 3.1 - 0.3 = 2.8$

Upper endpoint = $\bar{x} + E = 3.1 + 0.3 = 3.4$

One can be 95% confident that the true mean weight of newborn babies in the city is between 2.8 kg and 3.4 kg.

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