Answer on Question #37884, Math, Statistics.

Problem.

Kindergarten children have heights that are approximately normally distributed about a mean of 39 in. And a standards deviation of 2 in. A random sample of size 25 is taken and the mean X is calculated. What is the probability that this mean value Will be between 38.5 and 40.0 inches?

Solution.

There are parameters of normally distributed population and it is needed to estimate the sample parameters. So, Z-test is convenient to use, where $mean\ is\ \mu = 39, standard\ deviation\ is\ \sigma = 2,\ the\ sample\ size\ n =$
$25, the\ mean\ of\ the\ sample\ is\ X, for\ which\ the\ interval\ is\ [38.5, 40.0].$

$$Z_X = \frac{X - \mu}{\sigma/\sqrt{n}};$$

$$Z_{40.0} = \frac{40.0 - 39.0}{\frac{2}{\sqrt{25}}} = 2.5; area\ to\ the\ left\ of\ the\ Z - score\ is\ 0.99379\ and\ it\ is\ P(Z_X < 2.5)$$

$$Z_{38.5} = \frac{38.5 - 39.0}{\frac{2}{\sqrt{25}}} = -1.25,$$

$area\ to\ the\ left\ of\ the\ Z - score\ is\ 0.10565\ and\ it\ is\ P(Z_X < -1.25).$

Thus, it is possible to find the probability for a mean value to be between 38.5 and 40.0:

$$P(38.5 < X < 40) = P(-1.25 < Z < 2.5) = P(Z < 2.5) - P(Z < -1.25)$$
$$= 0.99379 - 0.10565 = 0.88814.$$

Answer.

The possibility is 0.88814