
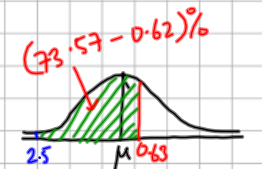


### Example 3

A normal distribution has a mean of 40 and a standard deviation of 4.  
 If 25 items are drawn at random, find the probability that their mean lies between 38 and 40.5.

$Z = \frac{\bar{x} - \mu}{\sigma_{\bar{x}}}$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$

**Standard error**

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{4}{\sqrt{25}} = \frac{4}{5} = 0.8$$

$\bar{x}_1 = 38$       $z_1 = ?$

$$z_1 = \frac{38 - 40}{0.8} = -2.5$$

**related to 2.5**

$$P(z \leq 2.5) = 99.38\%$$

$$P(z \leq -2.5) = 1 - 99.38\% = 0.62\%$$

$\bar{x}_2 = 40.5$       $z_2 = ?$

$$z_2 = \frac{40.5 - 40}{0.8} = 0.625 \approx 0.63$$

$$P(z \leq 0.63) = 73.57\%$$

$$P(-2.5 \leq z \leq 0.63) = 73.57\% - 0.62\%$$

$$P(38 \leq \mu \leq 40.5) = 72.95\%$$