

The fill amount of boxes of breakfast cereal is normally distributed with a mean of 750 g and a standard deviation of 25 g. A random sample of 25 packages is selected for measuring the weight. What is the probability that the sample mean will be

1. between 740 g and 750 g?

We have normal distribution with mean 750 and standard deviation – 25:

$$m = 750$$

$$\sigma_1 = 25$$

Standard deviation for random sample of 25 packages equals:

$$\sigma = \frac{25}{\sqrt{25}} = \sqrt{25}$$

And we need to know:

$$P(740 < x < 750)$$

$$P(740 < x < 750) = \int_{740}^{750} f(x) dx$$

$f(x)$ - probability density function

The normal distribution has probability density:

$$f(x) = \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{(x-m)^2}{2\sigma^2}}$$

Therefore:

$$P(740 < x < 750) = \int_{740}^{750} \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{(x-m)^2}{2\sigma^2}} dx$$

Calculating this integral:

$$P(740 < x < 750) = 0.4772 = 47.72 \%$$

Answer: 47.72 %