

## Answer on Question #63259 – Math – Statistics and Probability

### Question

The Mental Development Index (MDI) for infant development is a standardized measure used in longitudinal follow-up of high risk infants. The MDI scores are known to be normally distributed with mean 100 and variance 256. For a study of infants, a random sample of size 400 is selected.

**(a)** find the standard error of the mean MDI originating from this sample.

**(b)** find the percentage of the mean MDI score from this sample that

**(i)** will be greater than 101.6;

**(ii)** will be less than 98.4;

**(iii)** will be between 98.4 and 101.6.

### Solution

**(a)**

$$SE = \frac{\sigma}{\sqrt{n}} = \frac{\sqrt{256}}{\sqrt{400}} = 0.8.$$

**(b)**

**(i)**

$$P(\bar{x} > 101.6) = P\left(Z > \frac{101.6-100}{0.8}\right) = P(Z > 2) = 1 - P(Z < 2).$$

From z-table

$$P(Z < 2) = 0.9772;$$

$$P(\bar{x} > 101.6) = 1 - 0.9772 = 0.0228.$$

The percentage is 2.28%.

**(ii)**

$$P(\bar{x} < 98.4) = P\left(Z < \frac{98.4-100}{0.8}\right) = P(Z < -2) = P(Z > 2) = 0.0228.$$

The percentage is 2.28%.

**(iii)**

$$\begin{aligned} P(98.4 < \bar{x} < 101.6) &= P\left(\frac{98.4 - 100}{0.8} < Z < \frac{101.6 - 100}{0.8}\right) = P(-2 < Z < 2) = \\ &= P(Z < 2) - P(Z < -2) = 1 - P(Z > 2) - P(Z < -2) = \\ &= 1 - 0.0228 - 0.0228 = 0.9544. \end{aligned}$$

The percentage is 95.44%.

**Answer: (a) 0.8; (b) (i) 2.28%; (ii) 2.28%; (iii) 95.44%.**