# Questions on Sampling distribution of mean

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**Que** An electrical firm manufactures light bulbs that have a length of life that is approximately normally distributed, with mean equal to 800 hours and standard deviation of 40 hours. Find the probability that a random sample of 16 bulbs will have an average life of less than 775 hours.

**Soln**

$\bar{x} = 775$ $\quad \mu = 800$

$\sigma = 40$

$n = 16$

$$Z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} = \frac{775 - 800}{40/\sqrt{16}} = -2.5$$

$$P(\bar{x} < 775) = P(Z < -2.5) = 0.0062$$

from table

**Que** Travelling time between two campuses of a university in a city via shuttle bus takes, on average, 28 minutes with a standard deviation of 5 minutes. In a given week, a bus transported passengers 40 times. What is the probability that the average transport time was more than 30 minutes? Assume the mean time is measured to the nearest minute.

**Soln** $\mu = 28$

$\sigma = 5$

We want to find $P(\bar{x} > 30)$ with $n = 40$.

Since the time is measured on continuous scale to the nearest minute, an $\bar{x}$ greater than 30 is equivalent to $\bar{x} \geq 30.5$

$$\therefore P(\bar{x} > 30) = P\left(\frac{\bar{x} - 28}{5/\sqrt{40}} \geq \frac{30.5 - 28}{5/\sqrt{40}}\right)$$

$$= P(Z \geq 3.16)$$

$$= 0.0008.$$