Answer on Question #74156 – Math – Statistics and Probability

According to the Sleep Foundation, the average night's sleep is 7.6 hours. Assume the standard deviation is .6 hours and that the probability distribution is normal.

Question

a) What is the probability that a randomly selected person sleeps more than 8 hours?

Solution

$P(x > 8)$

$$z = \frac{x - \mu}{\sigma}$$

$$z = \frac{8 - 7.6}{0.6} = \frac{2}{3} \approx 0.6667$$

$$P(z > 0.6667) = 1 - 0.7486 = 0.2514$$

Question

b) What is the probability that a randomly selected person sleeps 6 hours or less?

Solution

$P(x \leq 6)$

$$z = \frac{x - \mu}{\sigma}$$

$$z = \frac{6 - 7.6}{0.6} = -\frac{8}{3} \approx -2.6667$$

$$P(z < -2.6667) = 0.0038$$

Question

c) Doctors suggest getting between 7 and 9 hours of sleep each night. What percentage of the population gets this much sleep?

Solution

$P(7 < x < 9)$

$$z = \frac{x - \mu}{\sigma}$$

$$z = \frac{7 - 7.6}{0.6} = -1$$

$$z = \frac{x - \mu}{\sigma}$$

$$z = \frac{9 - 7.6}{0.6} = \frac{7}{3} \approx 2.3333$$
$$P(-1 < z < 2.3333) = 0.9901 - 0.1587 = 0.8314$$
$$83.14\ \%$$