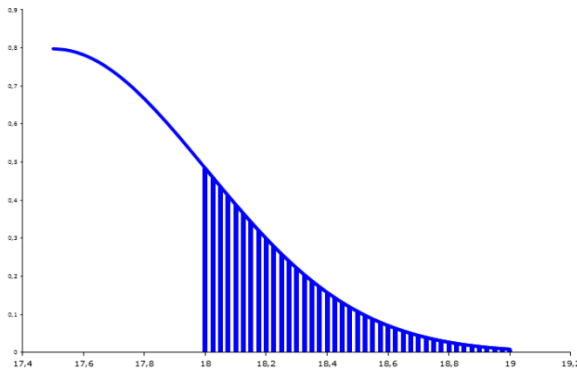


### Answer on Question #54323 – Math – Statistics and Probability

A car manufacturer takes an average of 17.5 hours to construct a car. This includes time for stamping, welding, painting, assembly and inspections. Construction times vary with a standard deviation of 30 minutes and these times follow a normal distribution.

Question: What is the probability that a randomly selected car manufactured at this plant takes between 18 and 19 hours to construct?

#### Solution



Given times follow a normal distribution with the average of  $E(X)=17.5$  hours and the standard deviation of  $sd(X) = \frac{30}{60} = 0.5$  hour, the probability that a randomly selected car manufactured at this plant takes between 18 and 19 hours to construct is

$$\begin{aligned} P(18 < X < 19) &= P\left(\frac{18 - E(X)}{sd(X)} < \frac{X - E(X)}{sd(X)} < \frac{19 - E(X)}{sd(X)}\right) = P\left(\frac{18 - 17.5}{0.5} < Z < \frac{19 - 17.5}{0.5}\right) = \\ &= P(1 < Z < 3) = P(Z < 3) - P(Z < 1), \end{aligned}$$

where  $X \sim N\left(17.5; \left(\frac{30}{60}\right)^2\right)$ ,  $Z \sim N(0; 1)$  are two random normally distributed variables.

From z-table we know

$$P(Z < 1) = 0.8413; P(Z < 3) = 0.9987.$$

Thus,

$$P(18 < X < 19) = 0.9987 - 0.8413 = 0.1574.$$

**Answer: 0.1574.**