

Answer on Question #71163 – Math – Statistics and Probability

Question

A student commutes daily from his house to school. On average, the trip one way takes 24 minutes with a standard deviation of 3 minutes. Assume that the data is normally distributed. What is the probability that the trip will take more than half an hour.

Solution

In this dataset,

$$\mu=24 \text{ and } \sigma=3.$$

We need to find the probability that the trip will take more than 30 minutes.

This is

$$P(T>30)=P(T-24>30-24)= P(T-24>6)= P((T-24)/3>6/3) = P((T-24)/3>2).$$

Now, if T follows $N(24,9)$, then $(T-24)/3$ follows $N(0,1)$, or the standard normal distribution.

$$P(T>30)=1-(P((T-24)/3<2)=1- \Phi (2),$$

where Φ is the cumulative distribution function of the standard normal distribution.

From the standard normal distribution tables, we have

$$\Phi(2)=0.97725.$$

Therefore,

$$P(T>30)=1-0.97725=\underline{0.02275}.$$

Answer: 0.02275.

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