

Topics: Continuous Probability Distribution

1. A train arrives at a station every 15 minutes. It is assumed that the waiting time for a particular individual is a random variable with a continuous uniform distribution.

- (a) What is the probability that the individual waits more than 10 minutes?
- (b) What is the probability that the individual waits between 6 and 12 minutes?

2. Given the standard normal distribution, find the value of k such that

- (a)

$$P(Z > k) = 0.9625$$

- (b)

$$P(Z < k) = 0.6255$$

- (c)

$$P(0.17 < Z < k) = 0.367$$

3. Given the normally distributed variable X with a mean of 20 and standard deviation of 2, find

- (a) $P(X < 16)$
- (b) the value of k such that $P(X < k) = 0.4090$
- (c) the value of k such that $P(X > k) = 0.8599$
- (d) $P(17 < X < 22)$

4. Suppose that the time, in hours, required to service a motorbike is a random variable X having a gamma distribution, with $k = 2$ and $\theta = \frac{1}{2}$. What is the probability that on the next service call,

- (a) at most 2 hours of service will be required?
- (b) at least 1 hour of service will be required?

5. The water supply board of a metropolitan city reveals that the each family consumes an average of 20 liters of drinking water per day, with a standard deviation of $\sqrt{200}$ liters. Let X denote the drinking water consumption per family and follow the gamma distribution.

- (a) Find k and θ
- (b) Find the probability that a randomly selected family consumes more than 20 liters on a particular day.

6. If the proportion of a brand of television requiring service during the first year of operation is a random variable having a beta distribution with $\alpha = 3$ and $\beta = 2$, what is the probability that at least 80% of the new models of this brand sold this year will require service during their first year of operation?

7. Rate data often follow a lognormal distribution. Average power usage (dB per hour) for a particular company is studied and is known to have a lognormal distribution with parameters $\mu = 4$ and $\sigma = 2$. What is the probability that the company uses more than 270 dB during any particular hour?
8. The number of automobiles that arrive at a certain intersection per minute has a Poisson distribution with a mean of 5. Interest centers around the time that elapses before 10 automobiles appear at the intersection.
 - (a) What is the probability that more than 10 automobiles appear at the intersection during any given minute of time?
 - (b) What is the probability that more than 2 minutes elapse before 10 cars arrive?