Chapter5: Continuous Probability Densities

Q1. The probability density function of the time required to complete an assembly operation is *f(x)* = 0.1 for *30 < x < 40* seconds.

a. What is the mean and standard deviation of the time of assembly?

b. Determine the proportion of assemblies that require more than 36 seconds to complete.

c. If 10 such assemblies are chosen at random, what is the probability that exactly 2 of them will require more than 36 seconds to complete?

d. Find the 75th percentile? Explain it.

Q2.
Suppose the waiting time for a bus is a random variable X having the probability density function $f(x) = 2e^{-2x}, x \geq 0$ and equals zero for $x < 0$.

    a) Find the probability the waiting time will exceed 1.75.
    b) Fin the expected waiting time for the bus.
    c) Find the median of the waiting time.

Q3.
Suppose component lifetimes are exponentially distributed with mean 10 hours. Find
    a. The probability that the lifetime of a component exceeds 10 hours.
    b. The median component lifetime.

Q4.
Given the normally distributed variable X with mean 18 and standard deviation 2.5, find
(a) $P(X < 15)$:
(b) the value of k such that $P(X < k) = 0.2236$;
(c) the value of k such that $P(X > k) = 0.1814$;
(d) $P(17 < X < 21)$.

Q5.
The finished inside diameter of a piston ring is normally distributed with a mean of 10 centimeters and a standard deviation of 0.03 centimeter.
(a) What proportion of rings will have inside diameters exceeding 10.075 centimeters?
(b) What is the probability that a piston ring will have an inside diameter between 9.97 and 10.03 centimeters?
(c) Below what value of inside diameter will 15% of the piston rings fall?

Q6:
A process yields 10% defective items. If 100 items are randomly selected from the process, what is the probability that the number of defectives (a) exceeds 13? (b) is less than 8?