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1. The number of failures of a testing instrument from contamination particles on the product is us a Poisson random variable with a mean of 0.02 failures per hour.

a) What is the probability that the instrument does not fail in an 8-hour shift?

$$X \sim \text{Poisson}(\lambda = 8(.02) = .16)$$

$$P(X = 0) = \frac{e^{-0.16} (0.16)^0}{0!} = e^{-0.16} = 0.8521$$

b) What is the probability of at least one failure in a 24-hour day?

$$Y \sim \text{Poisson}(\lambda = 24(.02) = 0.48)$$

$$P(Y \geq 1) = 1 - P(Y < 1) = 1 - P(Y = 0) = 1 - \frac{e^{-0.48} (0.48)^0}{0!} = 1 - e^{-0.48} = 1 - .6188 = .3812$$

2. A lot of 75 washers contains 5 in which the variability in thickness around the circumference of the washer is unacceptable. A sample of 10 washers is selected at random, without replacement.

a) What is the probability that at least one unacceptable washer is in the sample?

This is problem 3-90(b). Solution is posted.

b) What is the mean number of unacceptable washers in the sample?

This is problem 3-90(d). Solution is posted.