Answer on Question #80380 – Math – Statistics and Probability
Question

4) Suppose the manufacturer's specifications for the length of a certain type of computer cable are 2000 ± 10 millimeters. In this industry, it is known that short cable is just as likely to be defective (not meeting specifications) as long cable. That is, the probability of randomly producing a cable with length exceeding 2010 millimeters is equal to the probability of producing a cable with length smaller than 1990 millimeters. The probability that the production procedure meets specifications is known to be 0.99.

(a) What is the probability that a cable selected randomly is too long?
(b) What is the probability that a randomly selected cable is longer than 1990 millimeters?

Solution

Let A be the event that a cable meets specifications. Let S and L be the events that the cable is too short and too long, respectively. Then

(a) $P(A) = 0.99, P(S) = P(L) =>$

$$=> P(S) = P(L) = \frac{1 - P(A)}{2} = \frac{1 - 0.99}{2} = 0.005.$$

The probability that a cable selected randomly is too long
$$P(L) = 0.005$$

(b) Denoting by X the length of a randomly selected cable, we have
$$P(1990 \leq X \leq 2010) = P(A) = 0.99$$
$$P(X > 2010) = P(L) = 0.005$$
$$P(X > 1990) = P(A) + P(L)$$
$$P(X > 1990) = 0.99 + 0.005 = 0.995$$

The probability that a randomly selected cable is longer than 1990 millimeters is 0.995.

Answer: a) 0.005; **b)** 0.995.