Conditions

Christmas tree lights are used not only for Christmas trees but sometimes to decorate collegte doorm rooms. Suppose that a string has 20 light bulbs these lights are all wired in a series, so that if one light bulb fails, the whole string fails. The probability that any one light fails is 0.02. Each of the individual lights are independent of each other. What is the probability that the string will not fail?

Solution

The event, when the string will not fail, is the probability, when all 20 light bulbs will not fail. As we know from the conditions, each of the individual lights are independent of each other.

The probability that any one light will not fail is:

$$1 - 0.02 = 0.98$$

And we need all 20 to be complete. The unite of events is a product of probabilities. That's why the probability of that the string will not fail is:

$$P = 0.98^{20} \approx 0.6676$$

Answer: 0.6676