Answer on Question #81185 – Math – Statistics and Probability

Question

In a certain community, 10% of all people above 50 years of age have diabetes. A health service in this community correctly diagnoses 95% of all persons with diabetes as having the disease, and incorrectly diagnoses 5% of all persons without diabetes as having the disease. Find the probability that a person randomly selected from among all people of age above 50 and diagnosed by the health service as having diabetes actually has the disease.

Solution

D = diabetics

D’ = without diabetics

C = correctly diagnose

C’ = incorrectly diagnose

Thus:

D+D’ = 1

C+C’=1

P(D) = 0.1

P(D’) = 1-0.1=0.9

P(C|D) = 0.95

P(C|D’) = 0.05

$$P(D|C) = \frac{P(D) * P(C|D)}{P(D) * P(C|D) + P(D') * P(C|D')} = \frac{0.1 * 0.95}{0.1 * 0.95 + 0.95 * 0.05} = \frac{0.095}{0.1425} = 0.667$$

Answer:

The probability that a person randomly selected from among all people of age above 50 and diagnosed by the health service as having diabetes actually has the disease is 0.667.