

Answer on question 39061 – Math – Statistics

The disease is present in 22% of a population and is not present in the remaining 78%. An imperfect clinical test successfully detects the disease and with probability 0.70. Thus if a person has the disease in the serious form, the probability is 0.70 that the test will be positive and it is 0.30 if the test is negative.

Moreover among the unaffected persons, the probability that the test will be positive is 0.05.

(i) A person selected at random from the population is given the test and the result is positive. What is the probability that the test will be positive is 0.05.

(ii) What is the probability that the test correctly detects cancer?

Solution

(i) The probability that the test will be positive is

$$0.22 * 0.7 + 0.78 * 0.05 = 0.193.$$

(ii) The probability that a person selected at random from the population has a disease and the test is will be positive is $0.22*0.7=0.154$. The probability that a person unaffected and test is negative is $0.78*0.95=0.039$.

Therefrom the probability that test correctly detects cancer is

$$0.154 + 0.741 = 0.895.$$

Answer: (i) 0.193, (ii) 0.895.