

To solve the problem, we need to calculate two probabilities:

1. Probability that the test will be positive.
2. Probability that the person has cancer given the test is positive.

Let's denote the following:

- $P(+|C)$ : Probability of a positive test given that the person has cancer.
- $P(-|\neg C)$ : Probability of a negative test given that the person does not have cancer.
- $P(C)$ : Probability of having cancer (prior probability).

Given:

- $P(+|C)=0.90$  (Correct positive result rate)
- $P(-|\neg C)=0.10$  (Correct negative result rate)
- $P(C)=0.0001$  (Probability of having cancer in the entire population)

We can calculate the probability that the test will be positive using the law of total probability:

$$P(+)=P(+|C) \times P(C)+P(+|\neg C) \times P(\neg C)$$

$$\text{where } P(\neg C)=1-P(C).$$

Then, to find the probability that the person has cancer given the test is positive, we use Bayes' theorem:

$$P(C|+)=\frac{P(+|C) \times P(C)}{P(+)}$$

Let's compute these probabilities:

1. Probability that the test will be positive:

$$P(+)=(0.90 \times 0.0001)+(0.10 \times 0.9999) \\ P(+)=0.00009+0.09999=0.10008$$

2. Probability that the person has cancer given the test is positive:

$$P(C|+)=\frac{0.90 \times 0.0001}{0.10008} \\ P(C|+)=\frac{0.00009}{0.10008} \\ P(C|+)\approx 0.00089928$$

Therefore, the probability that the test will be positive is approximately 0.10008, and the probability that the person has cancer given the test is positive is approximately 0.00089928.