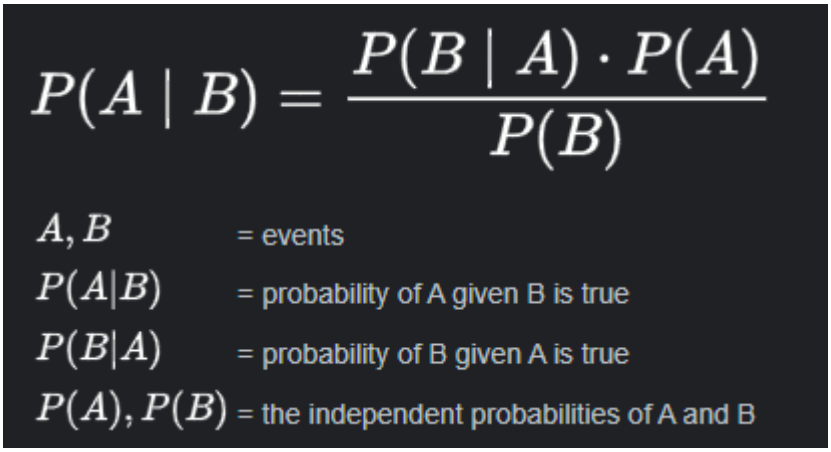
# Bayes Theorem using Python

Bayes' theorem is a fundamental concept in probability theory and statistics that describes how to update our beliefs about an event based on new evidence. It's commonly used in machine learning, especially in Bayesian statistics and Bayesian inference. Bayes' theorem can be expressed as:




We can use Python to implement Bayes' theorem with a simple example. Suppose we want to calculate the probability of a person having a disease (A) given that they tested positive (B), given the following information:

- The probability of having the disease ((P(A))) is 0.01 (1%).
- The probability of testing positive if you have the disease ((P(B|A))) is 0.95 (95%).
- The probability of testing positive if you don't have the disease ((P(B|\neg A))) is 0.05 (5%).

We can use Bayes' theorem to find (P(A|B)):

```
# Given probabilities
p_A = 0.01  # Probability of having the disease
p_B_given_A = 0.95  # Probability of testing positive if you have the
disease
p_B_given_not_A = 0.05  # Probability of testing positive if you don't have
the disease

# Calculate the probability of testing positive (P(B))
# P(B) = P(B|A) * P(A) + P(B|¬A) * P(¬A)
p_B = (p_B_given_A * p_A) + (p_B_given_not_A * (1 - p_A))

# Calculate the conditional probability of having the disease given a
positive test (P(A|B))
# P(A|B) = (P(B|A) * P(A)) / P(B)
p_A_given_B = (p_B_given_A * p_A) / p_B
```

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print("Probability of having the disease given a positive test:",
p_A_given_B)
```