Example:

Bernoulli Naive Bayes

Confident	Studied	Sick	Result
yes	NO	NO	Fail
yes	NO	yes	pass
NO	yes	yes	Fail
NO	yes	NO	pass
yes	yes	yes	pass

classify instance x' with

confident = yes, studied = yes, sick = NO

$P(Pass) = 3/5$ $\qquad$ $P(fail) = 2/5$

$P(confident = yes \mid Result = pass) = = 2/3$

$P(studied = yes \mid Result = pass) = 2/3$

$P(sick = yes \mid Result = pass) = 2/3$

$P(confident = yes \mid Result = fail) = 1/2$

$P(studied = yes \mid Result = fail) = 1/2$

$P(sick = yes \mid Result = fail) = 1/2$

P(X|Result = pass) × P(Result = pass)

$$= \frac{2}{3} \times \frac{2}{3} \times \frac{1}{3} \times \frac{3}{5} \implies \frac{12}{135}$$

$$= 0.088$$

P(X | Result = fail) × P(Result = fail)

$$= \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{2}{5} \implies \frac{2}{40}$$

$$= 0.05$$

P(X) = P(confident = yes) × P(studied = yes) ×
P(sick = No) :

$$= \frac{3}{5} \times \frac{3}{5} \times \frac{2}{5} \implies \frac{18}{125}$$

P(Result = pass|X) = 0.088 / 0.144

$$= 0.611$$

P(Result = fail | X) = 0.05 / 0.144

$$= 0.34$$

0.611 > 0.34

⟹ pass ✓

confident = yes, studied = yes, sick = No

result = pass