Conditional Probabilities

$$P(A \mid B) = \frac{P(A \cap B)}{P(B)}$$

P(A ∩ B)$= P(A|B)P(B)$

P(A ∩ B)$= P(B|A)P(A)$

Bayes and Naïve Bayes

$$P(S/1^{st}) = \frac{\overset{=P(1^{st}\,\&\,S)}{P(1st|S)P(S)}}{P(1st)}$$

$$P(\sim S/1^{st}) = \frac{\overset{=p(1s\,\&\,\sim s)}{P(1st|\sim S)P(\sim S)}}{P(1st)}$$

Bayes and Naïve Bayes

$$P(S/1^{st} \& Female) = \frac{P(1st \& Female|S)P(S)}{P(1st \& Female)}$$

$$P(\sim S/1st \& Female) = \frac{P(1st \& Female/\sim S)P(\sim S)}{P(1st \& Female)}$$

Naïve Bayes

P(S/1st&Female)= $P(1st\&Female|S)P(S) =$

Naive

$$P(1st/S) * p(Female|S)P(S)$$

P(~S/1s&Female)= $P\left(1st\&\dfrac{Female}{\sim S}\right)P(\sim S) =$

Naive

$$P(1st|\sim S) * P(Female/\sim S)P(\sim S)$$

Titanic Survival

Survived

<div align="center">Cabin</div>

	1st	2nd	3rd	Crew	Sub Total
Female	141	93	90	20	344
Male	62	25	88	192	367
Sub Total	203	118	178	212	711

Not Survived

<div align="center">Cabin</div>

	1st	2nd	3rd	Crew	Sub Total
Female	4	13	106	3	126
Male	118	154	422	670	1,364
Sub Total	122	167	528	673	1490

Bayes and Naïve Bayes

Max of $\quad P(\ominus 1 | S) P(\ominus 2 | S) P(S) ,$ **Over all possible** S