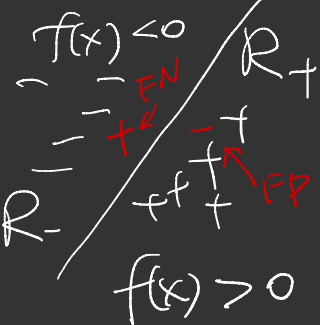


$$\begin{aligned}
& P(x \text{ is FP, FN} | f) \\
&= \int_{R_+} p(x, -) dx + \int_{R_-} p(x, +) dx \\
&= \int \underbrace{1(f(x) > 0)}_{\text{Const.}} p(x, -) dx + \int \underbrace{1(f(x) < 0)}_{\text{Select an } f, \text{ such that}} p(x, +) dx \\
&= \int [1 - 1(f(x) < 0)] p(x, -) dx + \int 1(f(x) < 0) p(x, +) dx \\
&= \int p(x, -) + \underbrace{1(f(x) < 0)}_{\text{when } (2) < 0, (1) = 1} [\underbrace{p(x, +) - p(x, -)}_{\text{when } (2) > 0, (1) = 0}] dx \\
&= \underbrace{\int p(x, -) dx}_{\text{Const.}} + \underbrace{\int (1(f(x) < 0) [p(x, +) - p(x, -)]) dx}_{\text{Select an } f, \text{ such that}}
\end{aligned}$$



possible \Rightarrow choice of f

$$\begin{aligned}
& f(x) = p(x, +) - p(x, -) \\
& f(x) = \log p(x, +) - \log p(x, -) = \log \frac{p(x, +)}{p(x, -)}
\end{aligned}$$

Completing the square

$$\begin{aligned}
& W A W^T - 2 W^T b \\
&= W A W^T - 2 W^T b + \bar{b}^T \bar{A}^{-1} b - b^T \bar{A}^{-1} b \\
&= \underbrace{(W^T - \bar{A}^{-1} b)^T}_{\text{does not depend on } W} A (W - \bar{A}^{-1} b) - \bar{b}^T \bar{A}^{-1} b, \text{ when } A \text{ is } \underline{\underline{\text{invertible!}}}
\end{aligned}$$