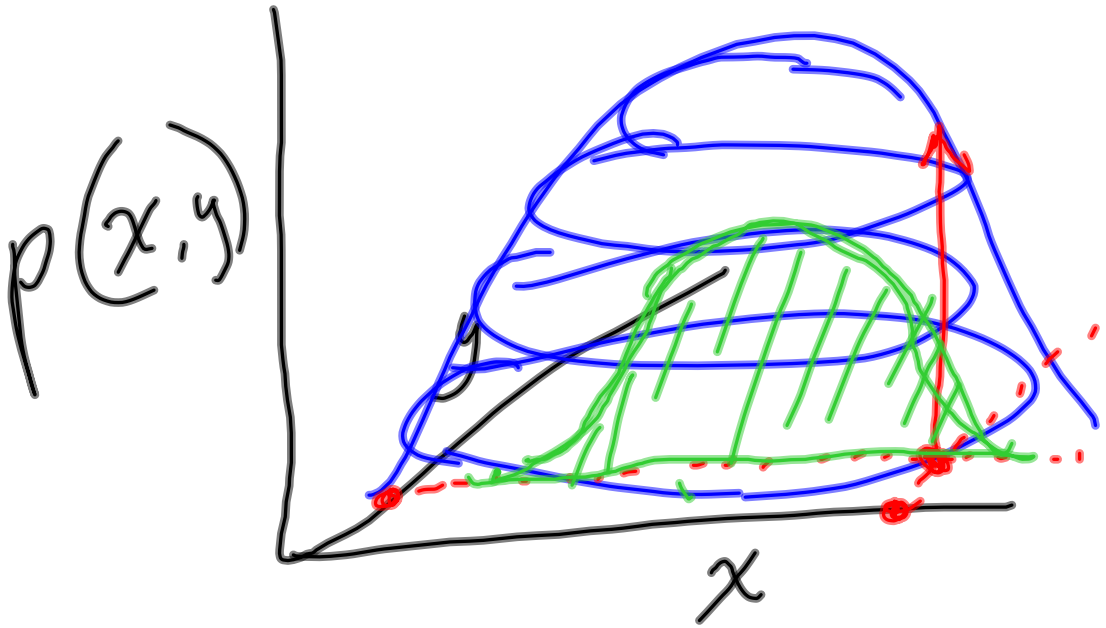
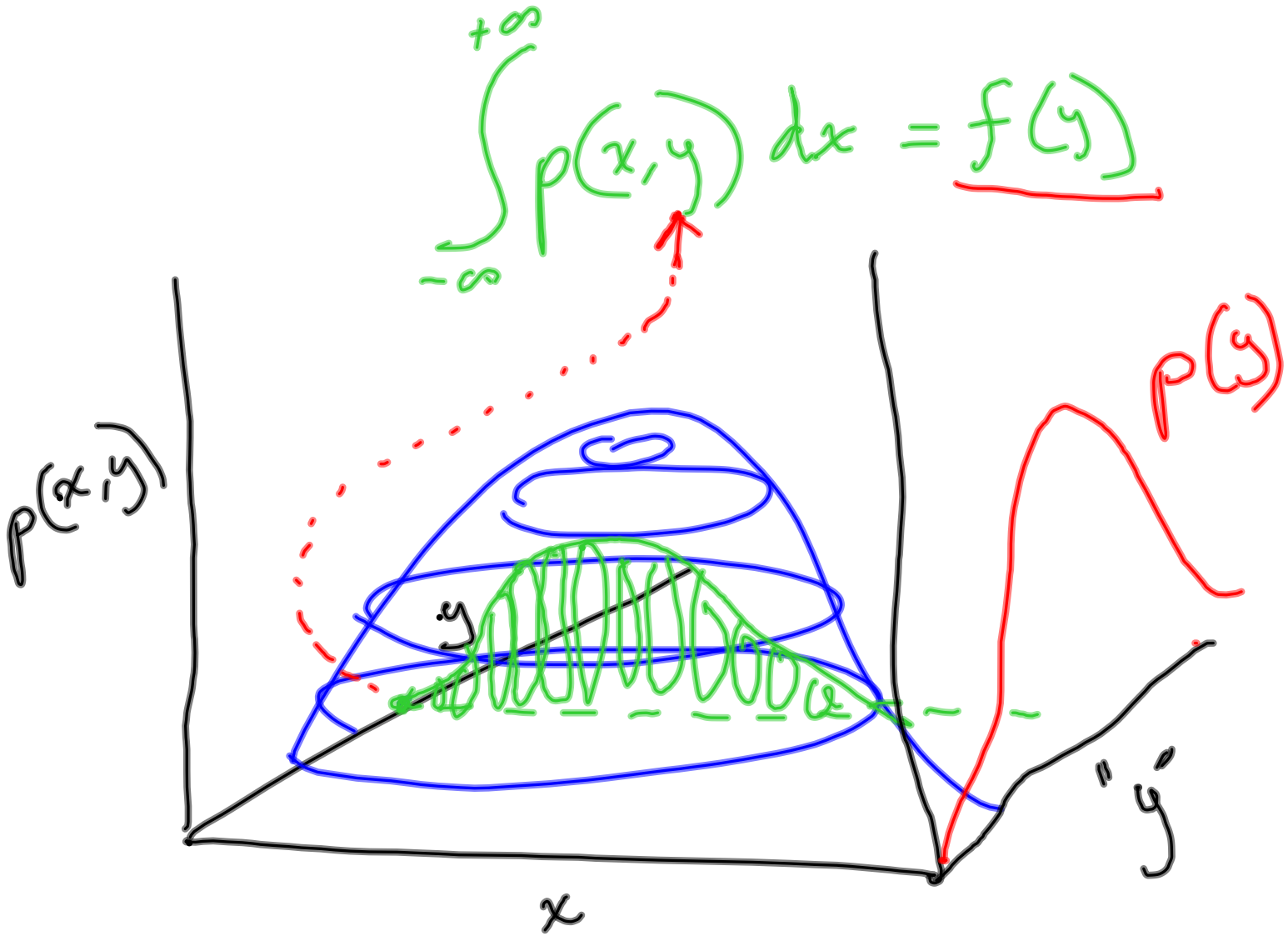
Fundamental Formula of conditional probability

$$p(x,y) = p(x|y)\,p(y)$$




$\int_{-\infty}^{+\infty} p(x,y)\,dx = f(y)$
p(x,y)
y
x
p(y)
"y"

"STAGES"

notation:

- x data
- s state description
- a parameters of $p_a(x|s)$
- b parameters of state equation $p(s|b)$

I. "data model" $p(x|s,a)$ Likelihood

II. "process model" $p(s|b)$

III. "parameter model" $p(a,b)$ prior on (a,b)

Wikle: $p(a,b|x) \propto p(x|s,a)\,p(s|b)\,p(a,b)$

Bayes: $p(s,a,b|x) \propto p(x|s,a,b)\,p(s,a,b)$

$p(s,a,b|x) \propto p(x|s,a)\,p(s,a,b)$

$p(s,a,b) \equiv p(s|a,b)\,p(a|b)\,p(b)$

$p(s|b)$ $p(a)$ $p(a,b)$

$p(s,a,b|x) \propto p(x|s,a)\,p(s|b)\,p(a,b)$