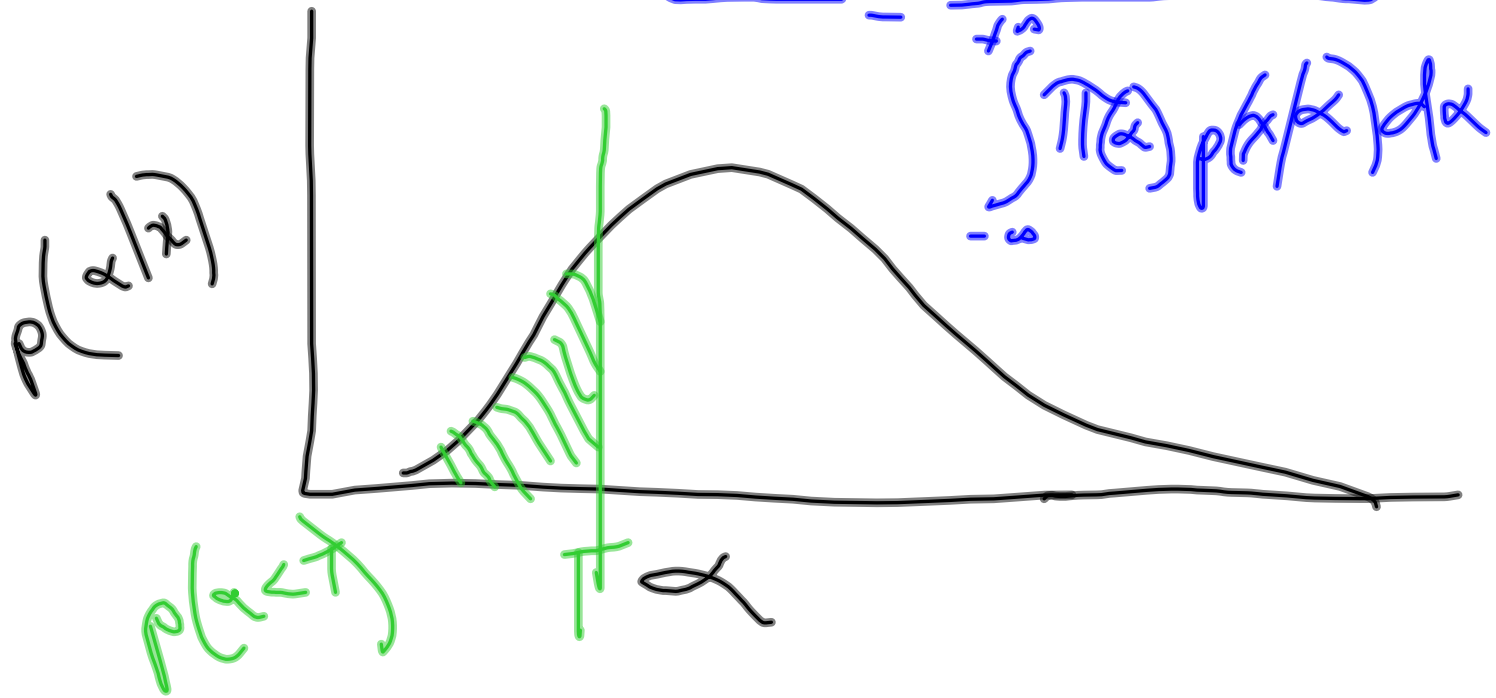
$$p(\alpha/x) = c\,\pi(\alpha)\,p(x/\alpha)$$

prior — likelihood function

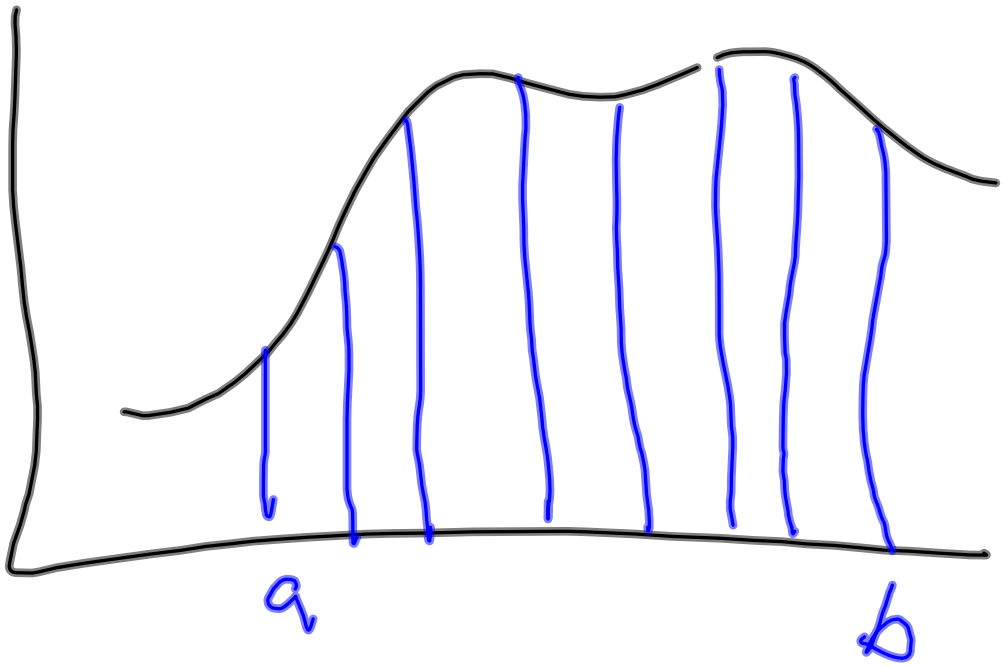
$$= \frac{1}{\int_{-\infty}^{+\infty} \pi(\alpha)\,p(x/\alpha)\,d\alpha}$$



Numeric Integration

Trapezoid Rule

Simpson's Rule

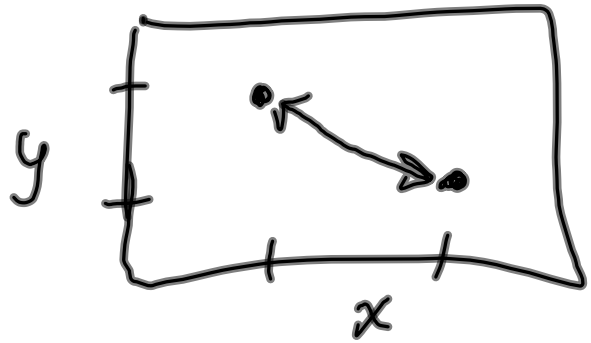


Curse of Dimensionality

"distance"

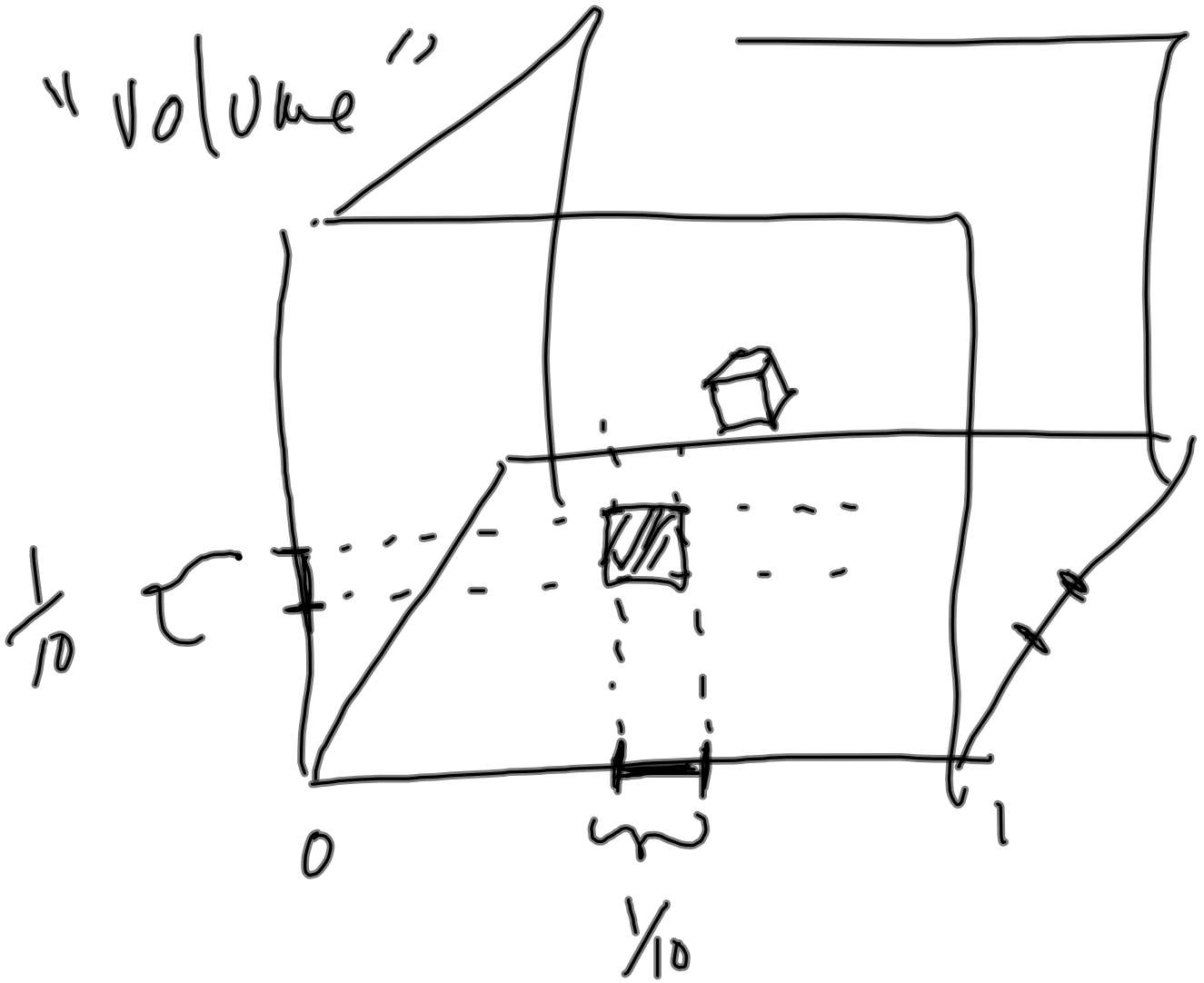
1-d

2-d



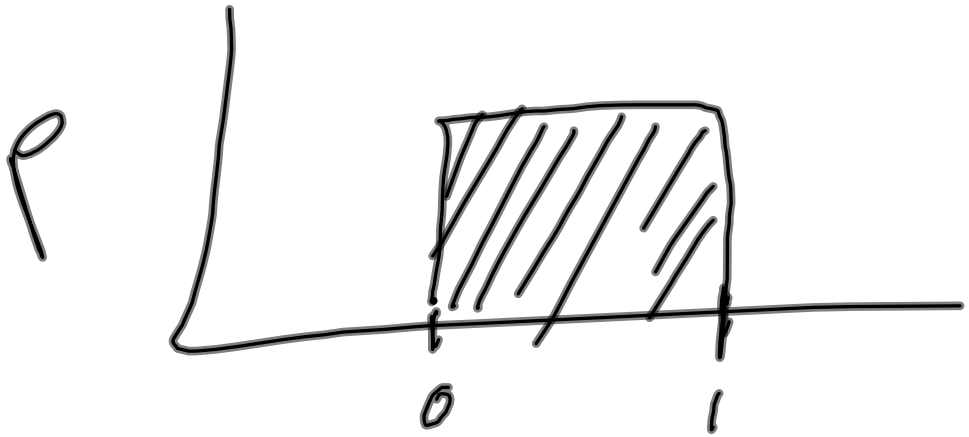
3-d $\quad \text{distance} = \sqrt{\Delta x^2 + \Delta y^2 + \Delta z^2}$

m-d $\quad \text{distance} = \sqrt{\sum_{i=1}^{m} \Delta x_i^2}$

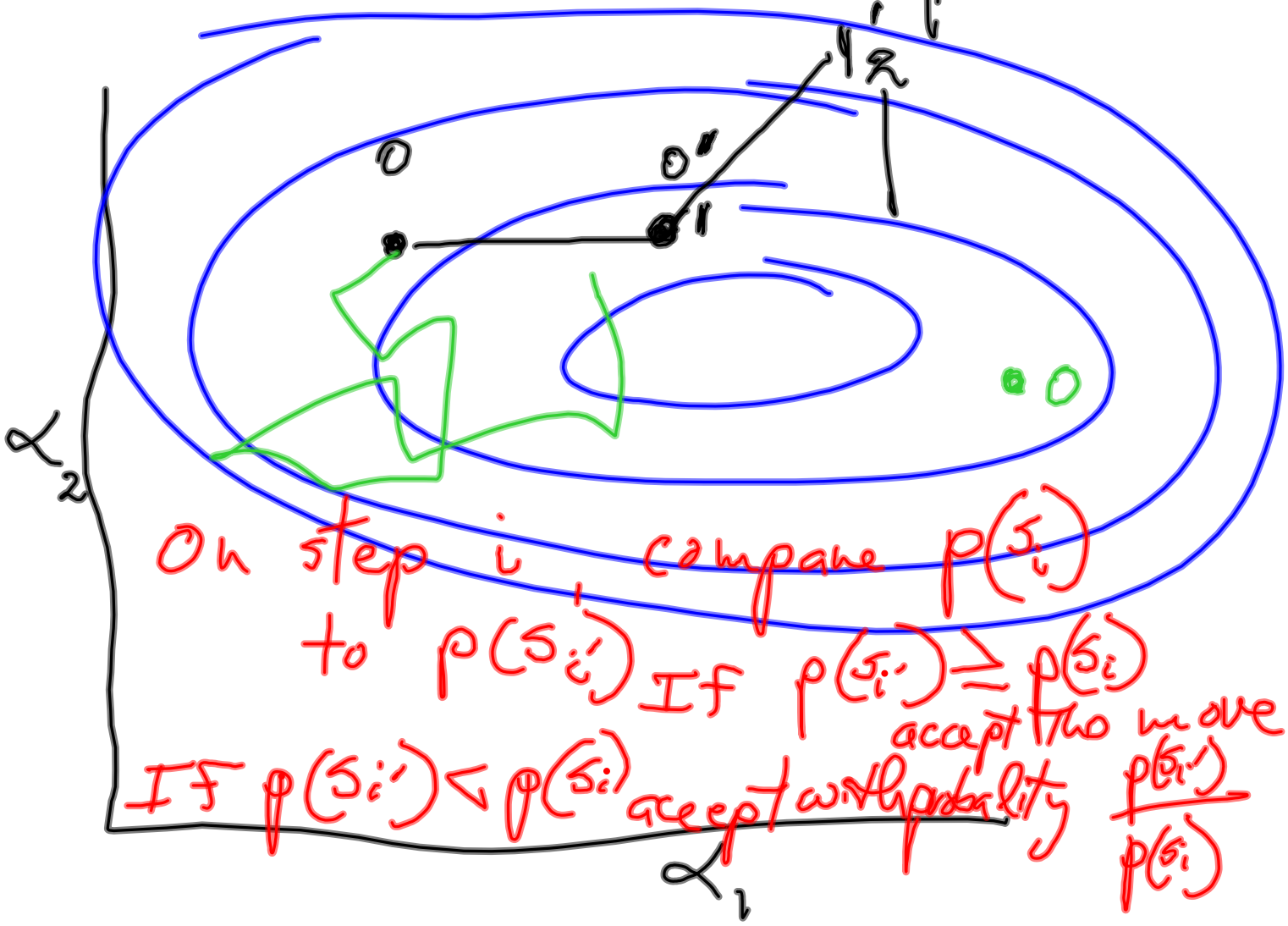

"volume"
1/10
0
1/10
1

"Random Number Generators"

uniform distribution



Random Walk Metropolis

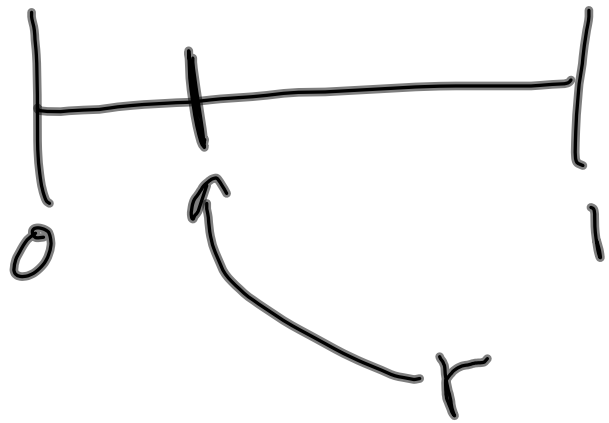


On step i, compare $p(x_i)$ to $p(x_{i'})$

If $p(x_{i'}) \geq p(x_i)$ accept the move

If $p(x_{i'}) < p(x_i)$ accept with probability $\frac{p(x_{i'})}{p(x_i)}$

Implementing a binary condition with probability $\frac{p(\sigma_i|1)}{p(\sigma_i)}$



"chain length"

"sample size"

"thinning"

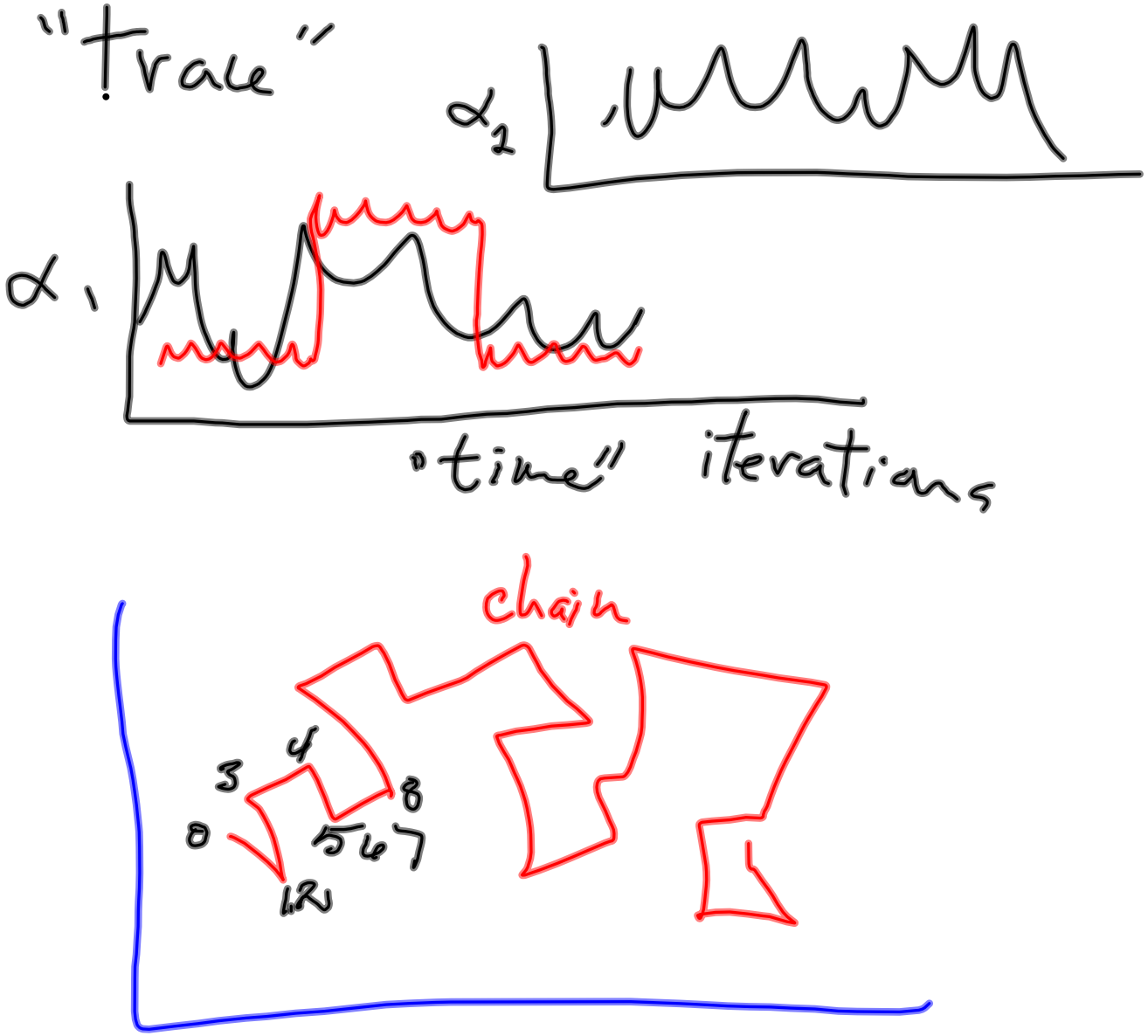
"burn in"

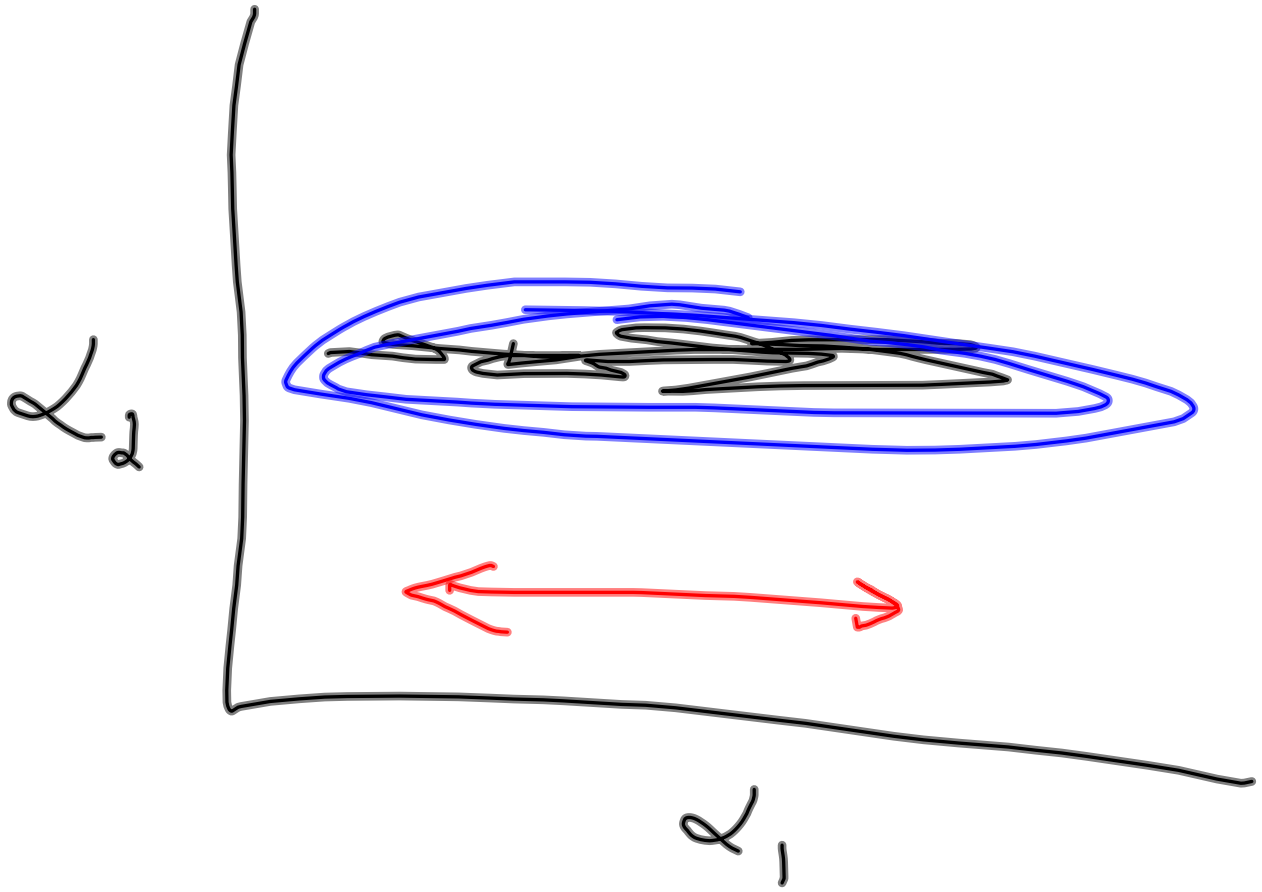
"convergence"

"number of chains"

"mixing rate"

"trace"


"trace"
α_2
α_1
"time" iterations
chain
0
3
4
5
6
7
8
12


$\mathcal{L}_2$
$\mathcal{L}_1$