

AM 169 Assignment 8

(due 12/6/00)
(assigned 11/20/00)

Gibbs Sampler

Use the graph of the cyclic Ising Model with $n=32$.

$$X_{ij} \in \{-1, 1\} \quad \text{for } 0 \leq i \leq n-1 \text{ and } 0 \leq j \leq n-1$$

$$\text{Energy } H(x) = - \sum_{\langle (i,j), (i',j') \rangle} X_{ij} X_{i'j'}$$

" $\langle \rangle$ " means $(i,j) \equiv (i',j')$ neighbors

$$P(x) = \frac{1}{Z_T} \exp \left\{ -\frac{1}{T} H(x) \right\} = \frac{1}{Z_T} \exp \left\{ \frac{1}{T} \sum_{\langle \cdot \cdot \rangle} X_{ij} X_{i'j'} \right\}$$

sum over all neighbors

Use the Gibbs Sampler to sample from P at
temperatures $T = 32, 16, 8, 4, 2, 1$

Use 200 full sweeps of the graph at each value
of T and start with a purely random
configuration of ± 1 s.

Plot each final sample in some form of picture
e.g. as a contour plot or
as a 32×32 array with $X_i = 1 \leftrightarrow *$
 $X_i = -1 \leftrightarrow -$