This MCMC
next: bootstrap

Q: \[ p(\mu, \sigma^2 | \mathbf{y}) \]?

A: no conjugate prior exists when \( \tau \) is unknown.

want \[ p(\mu, \sigma^2 | \mathbf{y}) \] and marginal post. for \( \mu \)

also want \[ p(\mu | \mathbf{y}) = \int p(\mu, \sigma^2 | \mathbf{y}) \, \text{d} \sigma^2 \]

\[ p(\mu, \sigma^2, \tau | \mathbf{y}) \] & \[ p(\tau | \mathbf{y}) \] each of these requires a \((p-1)\)-dimensional integration.

\begin{array}{cccc}
\text{iteration} & \hat{\mu} & \hat{\sigma}^2 & \hat{\tau} & \text{post.} \\
\text{starting values} & 0 & 1 & 1 & \text{values} \\
\text{initialize} & \mu & \sigma^2 & \tau & \text{table}
\end{array}
Iteration # i:

time series plot

1st order Markov chain: to know where to go next, I only need to know where I am now.

<table>
<thead>
<tr>
<th>init Q</th>
<th>m</th>
<th>σ²</th>
<th>r</th>
<th>y_{n+1}</th>
<th>σ₀²</th>
</tr>
</thead>
</table>

MCMC data set

Some Markov chains are nice: they have predictable limiting behavior.
where initialization fails

\[ \mu \]

\[ \mathcal{B} \]

\[ \text{iter } \# (v) \]

huge variance \( \Rightarrow \) tiny precision

\[ p(\mu | \mathcal{B}) \approx 10^{-6} \]

\[ \Sigma(\epsilon,t) \]

\[ p(\mathcal{B} | \epsilon) \]

\[ \mu \]

\[ \mathcal{B} \]

\[ 0 \]

\[ 2 \]

\[ 1 \]

\[ 6 \]

\[ 10 \]

\[ 50 \]