Previously on MA40189:

- Markov Chain Monte Carlo:
  - construct a Markov chain that has the required posterior distribution as its stationary distribution
  - sample from the chain until (approx) convergence
  - from this point, samples from the chain are viewed as a sample of values from the posterior distribution
  - use the resulting sample (from the stationary distribution) to estimate properties of the posterior distribution

Today on MA40189:

- each irreducible and aperiodic Markov chain X_t has a unique stationary distribution $\pi(x)$ which it converges to
- ergodic (aperiodic and positive recurrant) Markov chain

$$P\left\{\frac{1}{N}\sum_{i=1}^{N} g(X_i) \rightarrow E\{g(X) \,|\, X \sim \pi(x)\}\right\} = 1.$$

- i.e. ergodic averages converge to desired expectations
- we want to draw samples from $f(\theta \,|\, x) = cg(\theta)$
  - strategy is to set-up an irreducible and aperiodic Markov chain whose stationary distribution $\pi(\theta) = f(\theta \,|\, x)$
  - achieve this using the Metropolis-Hastings algorithm