Today on MA40189:

- Metropolis-Hastings algorithm
  - sample candidate point θ^* from proposal distribution $q(\theta \mid \theta^{(t-1)})$
  - either accept or reject move according to acceptance probability $\alpha(\theta^{(t-1)}, \theta^*)$

$$\alpha = \min\left(1, \frac{f(\theta^* \mid x) q(\theta^{(t-1)} \mid \theta^*)}{f(\theta^{(t-1)} \mid x) q(\theta^* \mid \theta^{(t-1)})}\right)$$

- if the proposal distribution is symmetric we obtain the Metropolis algorithm
  - if $f(\theta^* \mid x) > f(\theta^{(t-1)} \mid x)$ then accept the move
  - if $f(\theta^* \mid x) < f(\theta^{(t-1)} \mid x)$ then move with probability $f(\theta^* \mid x) / f(\theta^{(t-1)} \mid x)$
- example: sampling from the normal with symmetric normal proposal distribution, $\theta^* \sim N(\theta^{(t-1)}, \sigma^2)$
  - choice of σ^2 will determine the acceptance rate
  - high acceptance rates correspond to making small moves (large correlation)