1. Introduction
    - Variable selection and model-X knockoffs
    - Knockoff sampling is difficult
2. Characterizing knockoff distributions
    - The characterization theorem
    - Connection to Markov chain Monte Carlo (MCMC)
3. **Metropolized knockoff sampling (Metro)**
    - How it works
    - Time complexity and graphical structure
4. Good proposals inspired by the MCMC literature
    - Covariance-guided proposal
    - Multiple-try Metropolis (MTM)
5. Simulation results
6. Discussion

# Metropolized knockoff sampling (Metro)

**Step 1**

**target:** $p(X_1 \mid X_{-1})$