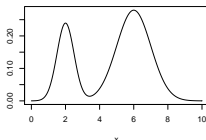# Questions for breakout rooms

The density above is
$\pi(\theta) = 0.3 \cdot \text{Normal}(\theta; 2, 0.5^2) + 0.7 \cdot \text{Normal}(\theta; 6, 1^2)$. It is easy to directly obtain a sample from this density, but below, we will use MCMC.

(a) Program in R a Random Walk Metropolis Hastings algorithm to derive an approximate sample from the density above. Use as proposal $\theta^* = \theta_{i-1} + \epsilon$ where $\epsilon \sim \text{Uniform}(-0.5, 0.5)$. Use the sample to approximate the expectation of the density above.

(b) Is your approximation accurate? How can you check whether it is accurate? What can you change in the algorithm above to get better accuracy?