

FINAL  
1 May 2009

1. Some criminologists believe that days of relatively high crime (RHC) tend to be followed by other RHC days. Conversely, others claim that RHC days are independently distributed throughout the year. In Chicago last year, there were six consecutive RHC days among the 67 RHC days throughout the 365 days of the year. Using this data and methods from this semester, describe a procedure to test the null hypothesis that RHC days are independently distributed.
2. Discuss the benefits and limitations of a Monte Carlo study (also known as a “simulation study”).
3. Using binary integer division, compute “11001001” divided by “101”. Please show your work.
4. Show and explain why the Gibbs sampler is a special case of the Metropolis-Hastings algorithm. Be sure to explain your notation.
5. Write a function (in R or pseudo-code) that yields 1,000 draws from a target distribution having density  $f(x)$  based on a rejection sampler with an envelope distribution having density  $g(x)$ . Define any other inputs (constants, functions, etc.) that are needed.