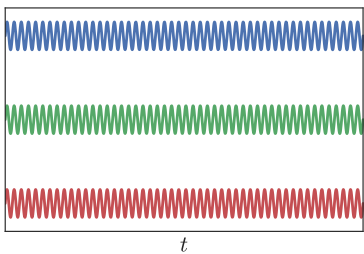
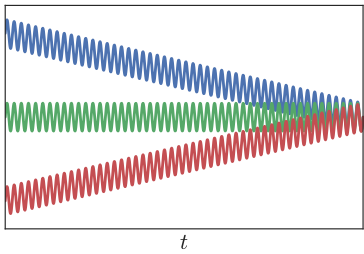
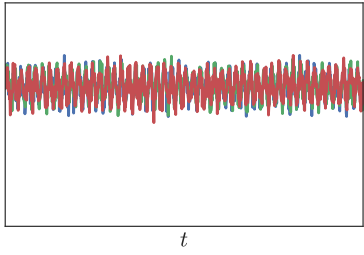


ISC 5228  
Markov Chain Monte Carlo  
In-class Assignment

**Gelman-Rubin Diagnostic Intuition**

Suppose you run  $n = 3$  independent runs for and collect  $2M$  samples from each. Suppose that the “trajectory” of the last  $M$  samples is as shown in the cartoons below.<sup>1</sup>

Let us consider these trajectories through the lens of the Gelman-Rubin convergence diagnostic.

trajectory	$W$	$B$	$\sigma_A^2$	$\hat{R}$
 <p>(a) distinct</p>				
 <p>(b) trending</p>				
 <p>(c) well-mixed</p>				

Describe what you expect for  $W$ ,  $B$ ,  $\sigma_A^2$ , and  $\hat{R}$  using your own words.

For example, you may describe  $W$  as small (medium/large), or smaller (about same/greater) than  $B$ . You can use similar labels to describe  $B$ .

For  $\sigma_A^2$  say whether it is (a) controlled by  $W$ , (b) controlled by  $B$ , or (c) controlled by both about the same.

For  $\hat{R}$  say whether it is (a) large (b) small, or anything in between.

<sup>1</sup>Often real trajectory looks like the three of them spliced together.