Homework 2
Due 15 March 2016

CS2952-S
email to mph@cs.brown.edu

March 8, 2016
Exercise 5.11  Show that barycentric agreement is impossible if a majority of the processes can fail: \( 2t \geq n + 1 \). (Hint: a partition occurs when two disjoint sets of non-faulty processes both complete their protocols without communicating.)

Exercise 5.12  Show that a barycentric agreement protocol is impossible if a process stops forwarding messages when it chooses an output value.

Exercise 6.8  Suppose the reliable broadcast protocol were shortened to deliver a message as soon as it receives \( t + 1 \) \texttt{Echo} messages from other processes. Describe a scenario where this shortened protocol fails to satisfy the reliable broadcast properties.

Exercise 6.9  Let \((\mathcal{I}, \mathcal{P}, \Xi)\) be a layered Byzantine protocol in which processes communicate by reliable broadcast. Show that:

- \( \Xi \) is not monotonic: if \( \sigma \subset \tau \), then
  \[ \Xi(\sigma) \nsubseteq \Xi(\tau). \]

- For any \( \sigma_0, \sigma_1 \) in \( \mathcal{I} \),
  \[ \Xi(\sigma_0) \cap \Xi(\sigma_1) \subseteq \Xi(\sigma_0 \cap \sigma_1). \]