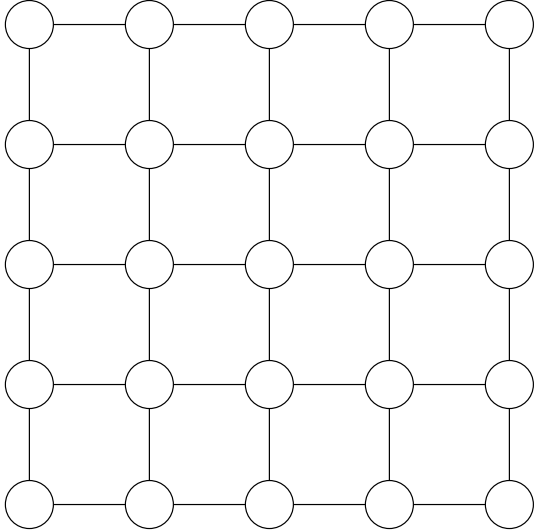


Homework Exercise #3

Due: October 20, 2008

3. Consider an asynchronous network of n deterministic processes arranged in a square grid pattern:



Each process has a unique id, but does not know n initially.

- (a) In the *alert-corner* problem, up to k of the n processes receive a request from their respective users to send an “alert” message to one of the corners of the square. All four corners of the grid should receive an alert message if and only if at least one process in the network has received such a request. Design an algorithm to solve the problem using $O(\min(n, k\sqrt{n}))$ messages.
- (b) Now suppose up to k of the n processes receive a request from their respective users to elect a leader. Design an algorithm that is efficient in terms of the number of messages it uses. Give the message complexity of your algorithm as a function of n and k .