2. (a) $F = cρu^2A$ for some constant $c$.
   
   (b) That the three variables were the only variables that mattered.

3. (a) Say the nodes are labeled 1 up to $n$. Let $f(i)$ be the number of times that $i$ goes on. Claim that $f(i) \leq 2^{i-1}$. Proof by induction. If node 1 goes on, then it never goes off, since it has no smaller neighbor. So that’s the base case. In general, if node $i$ goes on, none of its neighbors are on. So to go off, it must be that one of its smaller neighbors go on. Thus $f(i) \leq (f(1) + \cdots + f(i - 1)) + 1$. By inductive hypothesis, $f(i) \leq (2^0 + \cdots + 2^{i-2}) + 1 = 2^{i-1}$.

4. The $2 \times 2$ arrays

\[
\begin{array}{cc}
1 & 2 \\
3 & 4 \\
\end{array}
\quad \text{and} \quad
\begin{array}{cc}
1 & 3 \\
2 & 4 \\
\end{array}
\]

are both stable so one is not in the desired order.

5. After 7 steps it reaches 4 blinkers.

6. (a) The present value is the sum of money that must be invested now to yield the desired future payout. $PV = \frac{x}{r}(1 - e^{-rT})$.
   
   (b) A perpetuity pays out forever. It is equivalent to an interest payment, and so $PV = x/r$.

7. $P$ eats $N$. $Q$ eats both $P$ and $N$. There is a carrying capacity $K$ for $N$. 