5) a) For very large powers of k, A^k is not a positive matrix

b) Theorems 4, 6, and 8 rely on the initial assumption that A is either a positive, or regular matrix.

8) $G = \alpha A + (1-\alpha) S$

$\sum_{i=1}^{n} G_{ij} = \sum_{i=1}^{n} \alpha A_{ij} + (1-\alpha) S_{ij}$ Assuming G is stochastic, the sum of the jth column of G, and $\alpha A + (1-\alpha) S$ must be 1

$\sum_{i=1}^{n} G_{ij} = \sum_{i=1}^{n} \alpha A_{ij} + \sum_{i=1}^{n} (1-\alpha) S_{ij}$ Distribute summation to each term

$\sum_{i=1}^{n} G_{ij} = \alpha \sum_{i=1}^{n} A_{ij} + (1-\alpha) \sum_{i=1}^{n} S_{ij}$ Constants can be factored out

$1 = \alpha(1) + (1-\alpha)(1)$ The sum of the jth column of A and S equals 1

$1 = \alpha + (1-\alpha) \rightarrow 1 = 1$ ✓ $\therefore$ $\alpha A + (1-\alpha) S$ is a stochastic matrix