Name: _____ Student #: _____

Program & Year: _____

STA 447/2006S, Spring 2002: Test #1

(Thursday, February 14, 2002. Time: 80 minutes.)

(Questions: 1, with 8 parts; Pages: 4; Total points: 80.)

NO AIDS ALLOWED. You may use results from class.

1. For each of the following sets of conditions, either give (with explanation) an example of a valid transition matrix (p_{ij}) for a Markov chain on a state space S which satisfies the conditions, or prove that no such Markov chain exists.

(a) (10 points) $3/4 < p_{12}^{(n)} < 1$ for all $n \geq 1$.

(b) (10 points) $p_{11} > 1/2$, and the state 1 is transient.

1. (continued)

(c) (10 points) $p_{11} > 1/2$, and the period of state 2 equals 2, and the chain is irreducible.

(d) (10 points) $p_{12} = 0$ and $p_{12}^{(3)} = 0$, but $0 < p_{12}^{(2)} < 1$.

1. (continued)

(e) (10 points) $f_{12} = 1/3$, and $f_{13} = 2/3$.

(f) (10 points) $f_{12} = 1/2$, and $f_{13} = 2/3$.

1. (continued)

(g) (10 points) $\lim_{n\to\infty} p_{21}^{(n)} = 1/3$.

(h) (10 points) $p_{12}^{(n)} \geq 1/4$ and $p_{21}^{(n)} \geq 1/4$ for all $n \geq 1$, and the state 1 is transient.