**ITEC451**

**Activity 33 - Solution**

**Name: .**

Markov Chain: A company has two machines. During any day, each machine that is working at the beginning of the day has a 1/3 change of breaking down. If a machine breaks down during the day, it is sent to a repair facility and will be working two days after it breaks down. (Thus, if a machine breaks down during day 3, it will be working at the beginning of day 5.) Letting the state of the system be the number of machines working at the beginning of the day, formulate a transition probability matrix for this situation. (Note: This is the problem 3 in page 927 of the textbook.)

Solution

0 working 1 working 2 working



For example, if 0 machines are working at the beginning of the current day, then two machines must have broken down during the previous day, and at the beginning of the next day two machines will be working. If two machines are working at the beginning of a day, let Wi = event that machine i doesn't break down during current day. Then next day begins with 0 machines working with probability

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P( W1∩W2) = (1/3)2 = 1/9

Next day begins with 1 machine working with probability

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P(W1∩W2) + P(W1∩W2) = 2(1/3)(2/3) = 4/9

Next day begins with 2 machines working with probability

P(W1∩W2) = (2/3)2 = 4/9