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function X = genLinearStateSequence(x_0, P_0, A, Q, N)
%GENLINEARSTATESEQUENCE generates an N-long sequence of states using a
% Gaussian prior and a linear Gaussian process model
%
%Input:
% x_0 [n x 1] Prior mean
% P_0 [n x n] Prior covariance
% A [n x n] State transition matrix
% Q [n x n] Process noise covariance
% N [1 x 1] Number of states to generate
%
%Output:
% X [n x N+1] State vector sequence
%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Your code here
X = zeros(length(x_0), N+1);
q = mvnrnd(zeros(length(x_0),1), Q, N+1)';
X(:,1) = mvnrnd(x_0, P_0);
for i=2:N+1
 X(:,i) = A*X(:,i-1)+q(:,i-1);
 i = i+1;
end
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
end
```

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