Boeing v. Airbus Markov Chain

(Same problem but modified probabilities relative to lecture)

A survey of worldwide airlines indicates that if a particular airline buys a Boeing, there is a 70% chance that their next purchase will be a Boeing, while airlines with Airbus aircraft will buy an Airbus again with a probability of .78. In this problem we presume no knowledge of the fleet each airline owns due to past purchases – this simplification allows us to make the Markov assumption. The buying habits of airlines are represented in the transition matrix below.

Next Purchase

		Boeing	Airbus
Present Purchase	Boeing	.70	.30
	Airbus	.22	.78

Specify the following probabilities:

a) The probability that a present owner of a Boeing will buy an Airbus as its fourth aircraft, assuming aircraft purchases are sequential and made one at a time (no package deals).

b) The probability that a present owner of a Boeing will buy a Boeing as its ninth aircraft, assuming aircraft purchases are sequential and made one at a time (no package deals).

MATLAB CODE SOLUTION:

```
M=[0.7, 0.3; 0.22, 0.78];

% Part a
x1=[1, 0];  % Initially:  Boeing aircraft owned (1st aircraft)
% Right Multiply by M three times to compute probabilities for
% aircraft 4
x4 = x1*M^3
fprintf('Probability of an Airbus is x4 = %f\n',x4(2));

% Part b:  Follow a similar procedure
x9 = x1*M^8
fprintf('Probability of a Boeing is x9 = %f\n',x9(1));
```

OUTPUT:

```
    x4 =

        0.4869    0.5131

    Probability of an Airbus as x4 = 0.513120

    x9 =

        0.4247    0.5753

    Probability of a Boeing as x9 = 0.424703
```