110 WORKSHEET 9.1

NAME ____Solutions_____

1. Two brands of a product are available - Brand A and Brand B. Of those who buy Brand A, 80% will buy it the next time. Of those who buy Brand B, 40% will buy it the next time.

A. Construct the **transition matrix** for this situation.

$$P = \begin{matrix} \\ A \\ B \end{matrix} \begin{matrix} \begin{matrix} A & B \end{matrix} \\ \begin{bmatrix} .8 & .2 \\ .6 & .4 \end{bmatrix} \end{matrix}$$

B. Suppose that people tend to buy this product every week and that this week, 30% of the people buy Brand A and the rest buy Brand B. What is the **initial-state distribution matrix** for this situation?

$$S_0 = \begin{matrix} \begin{matrix} A & B \end{matrix} \\ \begin{bmatrix} .3 & .7 \end{bmatrix} \end{matrix}$$

C. What percentage will buy Brand A next week? Indicate the matrix multiplication you performed.

$$S_0P = \begin{bmatrix} .3 & .7 \end{bmatrix} \begin{bmatrix} .8 & .2 \\ .6 & .4 \end{bmatrix} = \begin{bmatrix} .66 & .34 \end{bmatrix}$$

66% will buy brand A.

D. What percentage will buy Brand A the week after next? Indicate the matrix multiplication you performed.

$$S_0P^2 = \begin{bmatrix} .3 & .7 \end{bmatrix} \begin{bmatrix} .8 & .2 \\ .6 & .4 \end{bmatrix}^2 = \begin{bmatrix} .732 & .268 \end{bmatrix}$$

73.2% will buy brand A.