

Math 1553 Worksheet §§5.6-6.3

- 1.** Courage Soda and Dexter Soda compete for a market of 210 customers who drink soda each day.

Today, Courage has 80 customers and Dexter has 130 customers. Each day:

70% of Courage Soda's customers keep drinking Courage Soda, while 30% switch to Dexter Soda.

40% of Dexter Soda's customers keep drinking Dexter Soda, while 60% switch to Courage Soda.

- a)** Write a stochastic matrix A and a vector x so that Ax will give the number of customers for Courage Soda and Dexter Soda (in that order) tomorrow. You do not need to compute Ax .

- b)** Find the steady-state vector for A .

- c)** Use your answer from (b) to determine the following: in the long run, roughly how many daily customers will Courage Soda have?

- 2.** Let W be the set of all vectors in $\mathbf{R}^3$ of the form $(x, x - y, y)$ where x and y are real numbers.
- a)** Find a basis for $W^\perp$.

- b)** Let $x = \begin{pmatrix} 2 \\ -2 \\ 1 \end{pmatrix}$. Find the projection x_W of x onto the subspace W and the orthogonal projection $x_{W^\perp}$ of x onto the subspace $W^\perp$.