Name:_____

A computer virus is spreading through a computer network. An infected computer has a 90% chance of still being infected the next day. A healthy computer has a 50% chance of being healthy the next day. Today 20% of computers are infected. What percentage of computers will be infected two days from now?

$$P = \begin{matrix} \\ I \\ H \end{matrix} \begin{matrix} \begin{matrix} I & H \end{matrix} \leftarrow \text{tomorrow} \\ \begin{bmatrix} 0.9 & 0.1 \\ 0.5 & 0.5 \end{bmatrix} \end{matrix}$$

↑ today

$$S_0 = \begin{matrix} \begin{matrix} I & H \end{matrix} \\ \begin{bmatrix} 0.2 & 0.8 \end{bmatrix} \end{matrix} \quad \text{today}$$

$$S_1 = S_0 P = \begin{bmatrix} 0.2 & 0.8 \end{bmatrix} \begin{bmatrix} 0.9 & 0.1 \\ 0.5 & 0.5 \end{bmatrix} = \begin{bmatrix} 0.58 & 0.42 \end{bmatrix} \quad \text{tomorrow}$$

$$S_2 = S_1 P = \begin{bmatrix} 0.58 & 0.42 \end{bmatrix} \begin{bmatrix} 0.9 & 0.1 \\ 0.5 & 0.5 \end{bmatrix} = \begin{matrix} \begin{matrix} I & H \end{matrix} \\ \begin{bmatrix} 0.732 & 0.268 \end{bmatrix} \end{matrix}$$

two days from now

73.2% of computers will be infected 2 days from now.