Work carefully and neatly. You must show all relevant work! You may receive no credit if there is insufficient work.

[3pts] 1. Commuters can get into town by car or by bus. Surveys have shown that for those taking their car on a particular day, 20% take their car the next day. Also of those taking a bus on a particular day, 50% take their car the next day. Write the transition matrix for this process.

\[
\begin{bmatrix}
C & B \\
C & \begin{bmatrix} .2 & .5 \\ .8 & .5 \end{bmatrix} \\
B & \begin{bmatrix} .4 & .6 \\ .4 & .6 \end{bmatrix}
\end{bmatrix}
\]

[4pts] 2. Write the system of equations one would use to find the stable distribution for the following regular stochastic matrix. Do not solve!

\[
\begin{bmatrix}
.6 & .2 \\
.4 & .8
\end{bmatrix}
\begin{bmatrix}
x \\ y
\end{bmatrix} =
\begin{bmatrix}
x \\ y
\end{bmatrix}
\]

\[
.6x + .2y = x \\
.4x + .8y = y \\
x + y = 1
\]

\[
\Rightarrow \\
-.4x + .2y = 0 \\
.4x - .2y = 0 \\
x + y = 1
\]

[3pts] 3. Indicate any absorbing states and then determine if the following matrix is an absorbing stochastic matrix. You must justify your answer!

\[
\begin{bmatrix}
1 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 \\
0 & 0 & 0 & 1 \\
0 & 0 & 1 & 0
\end{bmatrix}
\]

States 1 and 2 are absorbing
However, matrix is not absorbing
People in states 3 + 4 can never make it into states 1 and 2.
They just bounce back and forth between 3 + 4