Interpreting Values in T^n, where T is any transition matrix. (absorbing or not)

In the matrix T, and all powers of it, the entries are the proportion of objects ending up in each state *relative to* the starting state.

Example: Let T be the transition matrix for deer migration each year.

$$T = \begin{bmatrix} .5 & .3 & .1 & 0 \\ .5 & .1 & 0 & .2 \\ 0 & .2 & .6 & .7 \\ 0 & .4 & .3 & .1 \end{bmatrix} \qquad T^2 = \begin{bmatrix} .4 & .2 & .11 & .13 \\ .3 & .24 & .11 & .04 \\ .1 & .42 & .57 & .53 \\ .2 & .14 & .21 & .3 \end{bmatrix}$$

- Of the deer that start in Habitat I, 50% of them will end up in Habitat II after 1 year. (note: this is 50% of the group of deer that start in Habitat I *not* 50 % of the whole deer population.

- Of the deer that start the year in Habitat I, 30% of them will end up in Habitat II after 2 years.

T^3, T^4, . . . T^n contain similar information for different time periods.

Interpreting Values in $T^n[\ ]_0$, where $[\ ]_0$ is an initial distribution

If $[\ ]_0$ is a distribution of objects in each state, then $T[\ ]_0$ is the distribution after one time period. Each entry is the proportion of the *entire population* of objects, without regard to where they started.

Example: Let $\begin{bmatrix} .25 \\ .25 \\ .25 \\ .25 \end{bmatrix}$ be the initial distribution of deer in each Habitat. (using transition matrix T above).

$$T[\ ]_0 = \begin{bmatrix} .225 \\ .2 \\ .375 \\ .2 \end{bmatrix} \qquad T^2[\ ]_0 = \begin{bmatrix} .21 \\ .1725 \\ .405 \\ .2125 \end{bmatrix}$$

- 22.5% of the entire deer population are in Habitat I at the end of the first year.
- 40.5% of the entire deer population are in Habitat III at the end of the second year.

$T^2[\ ]_0$, $T^3[\ ]_0$, . . . $T^n[\ ]_0$ contain similar information for different time periods.