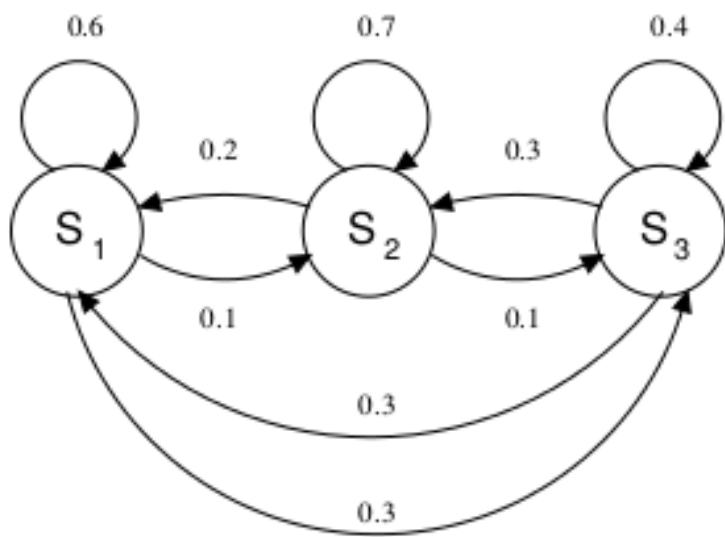# 9. Exercise: n-step calculation

Exercise: n-step calculation

2/2 points (ungraded)
Consider the following transition probability graph:

Calculate the three-step transition probability $r_{11}(3)$ by using the recursion formula $r_{ij}(n) = \sum_{k=1}^{3} r_{ik}(n-1)p_{kj}$.

$r_{11}(3) =$ | 0.419 | ✔ **Answer:** 0.419

Solution:

We first calculate the 2-step transition probabilities $r_{1k}(2)$:

$$
\begin{aligned}
r_{11}(2) &= p_{11}p_{11} + p_{12}p_{21} + p_{13}p_{31} \\
&= (0.6)(0.6) + (0.1)(0.2) + (0.3)(0.3) \\
&= 0.36 + 0.02 + 0.09 \\
&= 0.47, \\
r_{12}(2) &= p_{11}p_{12} + p_{12}p_{22} + p_{13}p_{32} \\
&= (0.6)(0.1) + (0.1)(0.7) + (0.3)(0.3) \\
&= 0.06 + 0.07 + 0.09 \\
&= 0.22, \\
r_{13}(2) &= p_{11}p_{13} + p_{12}p_{23} + p_{13}p_{33} \\
&= (0.6)(0.3) + (0.1)(0.1) + (0.3)(0.4) \\
&= 0.18 + 0.01 + 0.12 \\
&= 0.31.
\end{aligned}
$$

Using these 2-step transition probabilities, we can then calculate the desired 3-step transition probability:

$$
\begin{aligned}
r_{11}(3) &= r_{11}(2)p_{11} + r_{12}(2)p_{21} + r_{13}(2)p_{31} \\
&= (0.47)(0.6) + (0.22)(0.2) + (0.31)(0.3) \\
&= 0.419.
\end{aligned}
$$

提交　你已经尝试了1次（总共可以尝试3次）

ℹ **Answers are displayed within the problem**