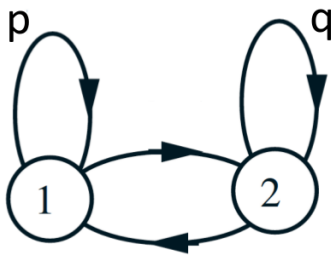# 12. Exercise: Convergence

None due May 29, 2020 05:29 IST

Exercise: Convergence

5 points possible (ungraded)

Consider the following transition probability graph, where $0 \leq p \leq 1$ and $0 \leq q \leq 1$:

1. Give the values of p and q for which you know for sure that $r_{12}(n)$ will never converge to a constant when n goes to infinity.

$p = $ [   ]   **Answer:** 0

$q = $ [   ]   **Answer:** 0

2. For each of the following pairs of (p, q), would it be guaranteed that $r_{11}(n)$ converges to zero as n goes to infinity?

- $p = 0.99, q = 1$

  [Select an option ▾]   **Answer:** Yes

- $p = 0, q = 0$

Select an option ∨   **Answer:** No

- $p = 1, q = 1$

Select an option ∨   **Answer:** No

Solution:

1. If $p = q = 0$, then $r_{12}(n) = 1$ for all odd n and $r_{12}(n) = 0$ for all even n.

2.
   - Yes. Eventually the chain will jump to 2 and stay there forever. Hence, the probability of ending up in state 1 after n transitions will converge to 0 as n goes to infinity.

   - No. As stated in part (1), there is no convergence in this scenario since $r_{11}(n)$ will alternate between 0 and 1.

   - No. Given that we start in state 1, we will stay in state 1 forever. Hence, $r_{11}(n) = 1$ for all n.

Submit	You have used 0 of 3 attempts

ℹ Answers are displayed within the problem

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? [Staff] Answer for 2c

   Question 2 asks if r11(n) converges to 0 as n goes to infinity. Compare the convergence value of r11(n) in...

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