

Problem 1 (10 Points) A hiker leaves the point O shown in Figure 1, choosing one of the roads OB_1 , OB_2 , OB_3 , OB_4 at random, assuming each outgoing arrow is equally probable for each node. At each subsequent crossroads she again chooses a road at random. What is the probability of the hiker arriving at the point A ?

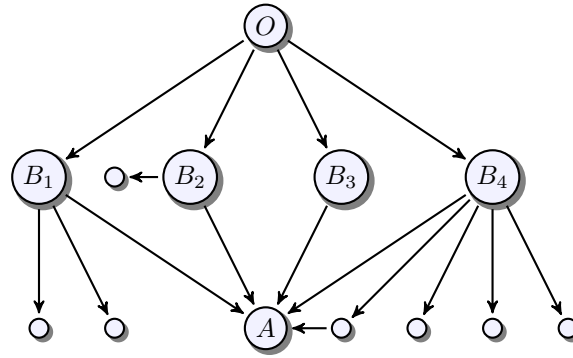


Figure 1: Problem Graph

Problem 2 (10 Points) Give examples of the following sequence of functions.

1. Give an example of a sequence of random variables which converges to zero at every point of the domain Ω which is $(0, 1)$, but the integral of each of the functions is equal to one.
2. Give an example of a sequence of random variables which converges to zero at every point of the domain Ω which is the entire real line \mathfrak{R} , but the integral of each of the functions is equal to one.
3. Give an example of a sequence of random variables which converges to zero in probability in $(0, 1)$ but does not converge to zero at any point. Show a subsequence that converges to zero everywhere.