

Analysis of Average Shortest Path Length vs. Probability of Edge Creation [9(d)]

Analysis of the Graph

The behavior of the data shown in the graph indicates that as p increases, the average shortest path length decreases. This is rational because a higher p implies a higher likelihood of edge to be between any two nodes in the graph. As a result, with an increase in the number of edges, the paths connecting any two nodes tend to become shorter, thereby reducing the average distance across the graph. Particularly, from $p = 0.3$ onward, the average distance stabilizes around 1.5, oscillating between 1 and 2. This stabilization suggests a graph structure where many vertices are directly connected to each other, or there exists at least one vertex that serves as a central hub connecting multiple nodes, thus facilitating shorter paths throughout the network.