Ex1 –

Description of parameters in Pregel:
- ❖ graph - the input graph
- ❖ initialMsg - the message each vertex will receive at the first iteration
- ❖ maxIterations - stopping criteria for sending messages
- ❖ activeDirection - setting which nodes will next send message
- ❖ vprog - the user program which runs on each vertex and receives the inbound message and computes a new vertex value
- ❖ sendMsg - function that is applied to out edges of vertices that received messages in the current iteration
- ❖ mergeMsg - function that takes two incoming messages of type A and merges them into a single message of type A

Ex2 –

1. Fraud Detection: Graph data solutions also help to find fraudulent transactions in a payment processing application based on the connected data that include the entities like users, products, transactions, and events.

2. Shortest Distance: Shortest distances and paths are also useful in social network applications. They can be used for measuring the relevance of a particular user in the network. Users with smaller shortest distances are more relevant than users farther away.

Ex3 –

A. The result before modification (code on GitHub):

```
(5,1.7002451224528383)
(3,1.1294346981766874)
(1,0.4390416708169825)
(4,0.9190514175420748)
(2,0.8122270910114175)
```

C. The result after modification (code on GitHub):

```
(4,0.7549827071549726)
(5,0.8946623413364332)
(3,1.0623988317888453)
(1,1.393293778383316)
(2,0.8946623413364332)
```

As a result, the first node becomes the most popular one