1. Consider the following trigger on the relation Purchase(\texttt{purchaseID}, \texttt{price}).

CREATE TRIGGER homeworkTrigger
BEFORE UPDATE OF Price on Purchase
FOR EACH ROW
REFERENCING OLD ROW as OldTuple
NEW ROW as NewTuple
WHEN (OldTuple.price > NewTuple.price AND NewTuple.price > 1)
BEGIN
    UPDATE Purchase
    SET price = NewTuple.price/2
    WHERE purchaseID = NewTuple.purchaseID
END

a) Suppose we issue an update to the Purchase table that changes the tuple (111, 4) to (111, 3).
Describe what will happen. What sequence of trigger firings will occur on the database and what will be the end result?
b) Repeat question a), except where BEFORE is replaced by AFTER.
c) Repeat question a), except where BEFORE is replaced by INSTEAD OF.

2. Assume that the total number of documents in a corpus is 128 and that the following words occur in the following number of documents:

“Computer” occurs in 32 documents
“software” occurs in 8 documents
“intelligent” occurs in 16 documents
“robust” occurs in 128 documents

1) Calculate the TF-IDF weighted term vector \( \text{WT}_D = \text{TK}_D \times \text{IDF} \) for the following document \( D \):

“Computer intelligent software robust computer software”

(Hint: all the numbers above are powers of 2, and the log in the IDF weight is taken to the base 2).

2) Suppose one has a query \( Q \) specified as:

“intelligent software”

Assuming that query vector is computed just in terms of TF weights (no IDF weights), and similarity is measured by the cosine metric, what is the similarity between \( Q \) and \( D \)?
3. Suppose we crawled a micro-web and got 4 pages. We will assume that the web is made up of just these 4 pages. The Web Graph for these 4 pages is as follows:

![Web Graph Diagram]

1) What is the transition matrix $M$ of the Web Graph?

Now a random surfer surfs this micro world. Suppose the pagerank for all pages is initialized to $1/4$. For each of the following cases, what will be the page rank after one iteration of the pagerank computation algorithm?

2) Just follow the links on the page in the Web Graph.

3) Follow the links on the page with probability 0.8, and randomly jump to any of the 4 pages (including the current page) with probability 0.2.

4. For each of the following schedules, state if it is serializable, conflict-serializable, or view-serializable.

The actions are listed in the order they are scheduled and prefixed with the transaction name.

1) T1:R(X), T2:W(X), T1:W(X), T2:Commit, T1:Commit

2) T1: W(X), T2: R(X), T1: W(X), T2: Commit, T1: Commit

3) T2: R(X), T3:W(X), T3:Commit, T1:W(Y), T1:Commit, T2:R(Y), T2:W(Z), T2:Commit

4) T1:R(X), T2:W(X), T1:W(X), T3:W(X), T1:Commit, T2:Commit, T3:Commit