Student ID:_____   Name:_____   Score (out of 19):_____

1. A brokerage firm StockTrade has the following relation for security trades in the year 2015:

    Trades(Stock_ID CHAR(3), Trade_Date DATE, Open_Price REAL, Close_Price REAL)

    The primary key is (Stock_ID, Trade_Date). For each of the following queries, identify:

    (a) a *single column* on which an index can make the query faster

    (b) whether to use a B+ Tree or Hash Table for the index

    (c) whether a clustered index could make the query faster

    (d) if the query has an index-only plan

    I.   SELECT * FROM Trades WHERE Stock_ID='A12'

          (a) Index on Stock_ID

          (b) Hash Table (since we have a look-up/matching operation)

          (c) Yes, clustered index helps (since a stock is typically traded everyday)

          (d) Not index-only (since we have SELECT *)

    II.   SELECT COUNT(*) FROM Trades WHERE Open_Price >10 AND Open_Price < 20

          (a) Index on Open_Price

          (b) B+ tree (since we have a range predicate in the WHERE clause)

          (c) No need to use a clustered index

   **(d) Index-only (since we just care about the count in the range)**

    III.   SELECT Stock_ID, COUNT(*) FROM Trades GROUP BY Stock_ID

          (a) Index on (Stock_ID)

          (b) B+ tree or hash table

          (c) No need to use a clustered index

          (d) Index-only

    IV.   SELECT Stock_ID, AVG(Open_Price) FROM Trades GROUP BY Stock_ID

          (a) Index on (Stock_ID)

          (b) B+ tree or hash table

          (c) A clustered index helps

          (d) Not index-only

2. Consider the following B+ tree on the primary key of a relation.
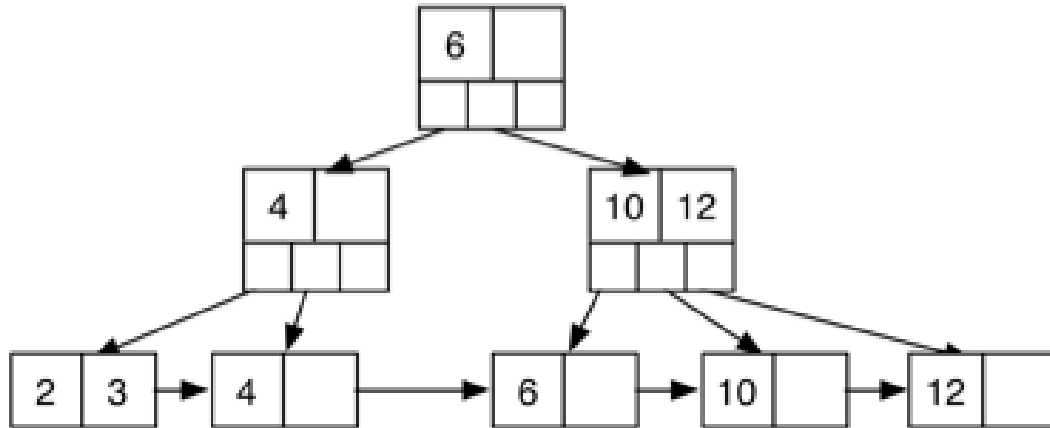
    a. What is the height of the tree?

      3

    b. How many pages do we need to read the values for the range query [3, 10] (inclusive)?

      6

    c. How many pages do we need to read the values for the range query [3, 7] (inclusive)?

      6