COSC 304 - Fall 2019 - Midterm Exam Two Solution

Part A:

1) b 2) e 3) d 4) e 5) d

Part B – Normalization

Question 1

i) a,c –> b a,c –> f a,e –> f a,c,d –> b,e,f a,d,e –> b,c,f
(The first three are the most meaningful)

ii) a,e –> b,c (2,3 notation)
b,c –> a (above and 4, Transitivity)

iii) Candidate Keys – Three: (a, c, d), and (a, d, e)

Question 2:

i) Suppose that in a table T(a, b, c, d, e, f), (a, c) and (a, d, e) are the only candidate keys **and table T is normalized to BCNF**.

		TRUE	FALSE	CANNOT TELL
1.	a, c → d, e	X		
2.	b → f		X	
3.	a, e → c		X	

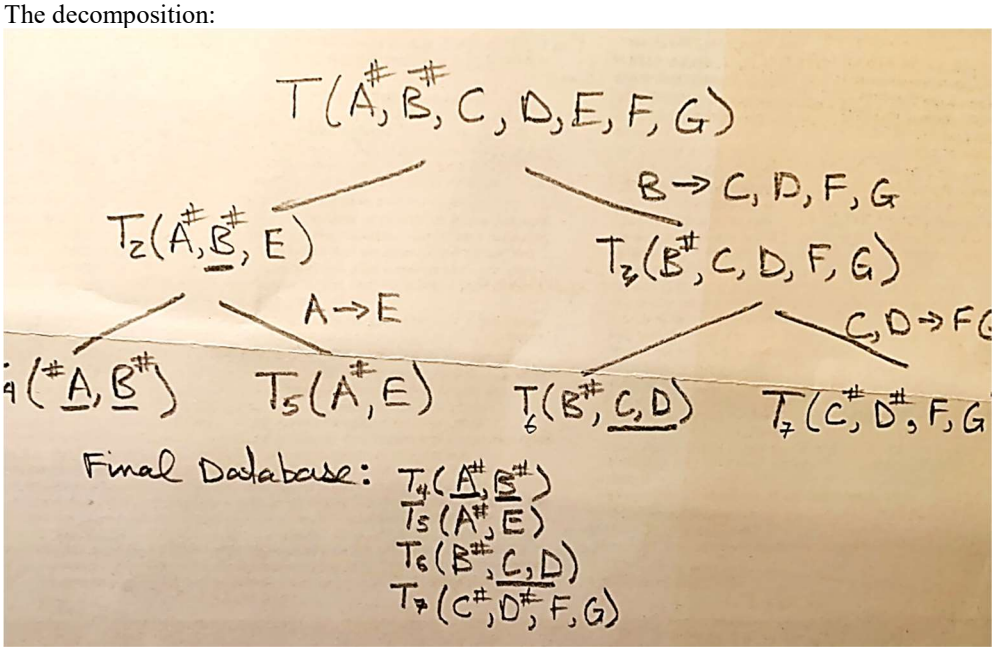
ii) Suppose that in a table T(a, b, c, d, e), (c, d) is the **only** candidate key.

		TRUE	FALSE	CAN NOT TELL
1.	c, d → e	X		
2.	a, b, e → c, d		X	
3.	d → a			X

Question 3:

- (A,B) is the only candidate key
- B –> C,D,F,G are all partial dependencies, therefore T is not normalized. There are many others.
- Functional dependency statements with the same determinant:
  - A,B –> everything
  - A –> E (partial dependency)
  - B –> C,D,F,G (partial dependencies)
  - C,G –> D, F (transitive dependencies)

The decomposition:



Part C – SQL

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-- Question 1
SELECT description ||
       DECODE(SUBSTR(PID,1,3), 'FRN', ' (Furniture)',
                               'BED', ' (Bedding)',
                               'LGH', ' (Lighting)')
FROM m2Sales s, m2Products p
WHERE s.pro_ID = p.PID
HAVING SUM(quantity * price) > 10000
GROUP BY description ||
         DECODE(SUBSTR(PID,1,3), 'FRN', ' (Furniture)',
                                 'BED', ' (Bedding)',
                                 'LGH', ' (Lighting)');

-- Question 2
SELECT City,
       SUM(DECODE(SUBSTR(PID,1,3), 'FRN', quantity * price,0)) Furniture,
       SUM(DECODE(SUBSTR(PID,1,3), 'FRN', 0, quantity * price)) Others,
       SUM(quantity * price) Total
FROM m2Sales s, m2Products p, m2Customers c
WHERE s.cus_ID = c.CID AND
      s.pro_ID = p.PID
GROUP BY City
ORDER BY City;

-- Question 3
SELECT EID,
       SUBSTR(e.name,INSTR(e.name,' ')+1) Name,
       SUM(DECODE(city, 'Ottawa', custSales.quantity*custSales.price,0)) OttawaSales,
       SUM(DECODE(city, 'New York', custSales.quantity*custSales.price,0)) NYCSales,
       SUM(NVL(custSales.quantity*custSales.price,0)) TotalSales
FROM m2Employees e, (SELECT s.quantity, p.price, emp_ID, c.city
                     FROM m2Sales s, m2Products p, m2Customers c
                     WHERE s.cus_ID = c.CID AND
                           s.pro_ID = p.PID) custSales
WHERE EID = custSales.Emp_ID (+)
GROUP BY EID, e.name
ORDER BY EID;
```