[Q.1.] Answer the following questions

(a) Create table T1 and table T2 as described below.

<table>
<thead>
<tr>
<th>Field</th>
<th>Type</th>
<th>Null</th>
<th>Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>int(11)</td>
<td>NO</td>
<td>PRI</td>
</tr>
<tr>
<td>B</td>
<td>char(1)</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>int(11)</td>
<td>YES</td>
<td></td>
</tr>
</tbody>
</table>

Table T1

<table>
<thead>
<tr>
<th>Field</th>
<th>Type</th>
<th>Null</th>
<th>Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>int(11)</td>
<td>NO</td>
<td>PRI</td>
</tr>
<tr>
<td>B</td>
<td>char(1)</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td>int(11)</td>
<td>YES</td>
<td></td>
</tr>
</tbody>
</table>

Table T2

(b) Insert values into table T1 and table T2 as shown below.

Table T1

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>a</td>
<td>5</td>
</tr>
<tr>
<td>15</td>
<td>b</td>
<td>8</td>
</tr>
<tr>
<td>25</td>
<td>a</td>
<td>6</td>
</tr>
</tbody>
</table>

Table T2

<table>
<thead>
<tr>
<th>P</th>
<th>B</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>a</td>
<td>6</td>
</tr>
<tr>
<td>15</td>
<td>b</td>
<td>5</td>
</tr>
<tr>
<td>25</td>
<td>b</td>
<td>3</td>
</tr>
</tbody>
</table>

(c) Show the retrieved table after the following query is executed.

```
select * from T1, T2
where T1.A = T2.P;
```

(d) Show the retrieved table content after the following query is executed.

```
select *
from T1 natural join T2;
```

(e) Show the retrieved table content after the following query is executed.

```
select * from T2 right outer join T1
on T1.C = T2.Q;
```
Answer the following questions (based on company database and tennis database – refer to the HW assignments 1, 2, 3, and 4)

(a) Explain what would be retrieved by the following query

```sql
SELECT DISTINCT PNUMBER
FROM PROJECT
WHERE PNUMBER IN
  (SELECT PNUMBER
   FROM PROJECT, DEPARTMENT, EMPLOYEE
   WHERE DNUM = DNUMBER AND MGRSSN = SSN AND LNAME = 'Smith')
  OR
  PNUMBER IN
  (SELECT PNO
   FROM WORKS_ON, EMPLOYEE
   WHERE ESSN = SSN AND LNAME = 'Smith');
```

(b) Explain what would be retrieved by the following query

```sql
SELECT distinct pnumber
  FROM project, department, employee, works_on
  WHERE (dnum= dnumber and mgrssn=ssn and lname='smith')
  OR (Pnumber = pno and essn = ssn and lname='smith');
```

(c) Explain what would be retrieved by the following query

```sql
SELECT playerno,sum(amount) from penalties
  group by playerno having sum(amount) > 150;
```

(d) Explain what would be retrieved by the following query

```sql
SELECT penalties.playerno,sum(amount) as amount from penalties,
  teams
  WHERE teams.playerno = penalties.playerno
  group by playerno having sum(amount) > 80;
```

(e) Explain what would be retrieved by the following query

```sql
SELECT playerno,sum(amount) as amount from penalties
  group by playerno order by sum(amount) desc limit 1;
```

(f) Explain what would be retrieved by the following query

```sql
SELECT playerno, teamno, (won-lost) as difference
  FROM matches order by difference asc;
```

(g) From simpleUniversity database, write a SQL statement to retrieve the names of all courses taught by Professor Knuth or Professor Chang in 2004 and 2005.

(h) From simpleUniversity database, write a SQL statement to retrieve the names of all courses taught by Professor Knuth or Professor Chang in 2004 and 2005.

(i) From simpleUniversity database, write a SQL statement to retrieve the names of all senior students majoring in CS
(j) From ap database, write a SQL statement to retrieve all vendors located in IA state.

(k) From ap database, write a SQL statement to retrieve all invoices with balance due
You may use where clause with the following condition
invoice_total > payment_total + credit_total;

(l) From ap database, write a SQL statement to retrieve invoices on or after ‘2011-07-01’

(m) From ap database, write a SQL statement to retrieve vendors with names from A to L

(n) What does the following SQL statement perform?

```sql
select invoice_number, vendor_name
from invoices, vendors
where vendors.vendor_id = invoices.vendor_id
order by invoice_number;
```