CS 338 – Fall 2013
Solutions to Assignment #1

TPC-H

1-
```
SELECT c_name
FROM customer
WHERE c_acctbal > 9000 AND c_mktsegment = 'HOUSEHOLD';
```

2-
```
SELECT DISTINCT p_partkey, p_name
FROM part, partsupp, supplier, nation, region
WHERE p_partkey = ps_partkey AND ps_suppkey = s_suppkey AND s_nationkey = n_nationkey
AND n_regionkey = r_regionkey AND r_name = 'MIDDLE EAST'
ORDER BY p_partkey;
```

3-
```
SELECT COUNT(DISTINCT ps_partkey)
FROM partsupp, supplier, nation, region
WHERE ps_suppkey = s_suppkey AND s_nationkey = n_nationkey AND n_regionkey =
r_regionkey AND r_name = 'EUROPE'
```

4-
```
(SELECT p_partkey, p_partname FROM part)
EXCEPT
(SELECT p_partkey, p_partname FROM part, partsupp, supplier, nation, region WHERE
ps_suppkey = s_suppkey AND s_nationkey = n_nationkey AND n_regionkey = r_regionkey AND
r_name = 'EUROPE')
```

5-
```
WITH custkeys AS (
(SELECT c_custkey FROM customer)
EXCEPT
(SELECT c_custkey
FROM lineitem, orders, customer, supplier, nation nc, nation ns
WHERE l_orderkey = o_orderkey AND o_custkey = c_custkey AND c_nationkey = nc.n_nationkey
AND nc.n_regionkey <> ns.n_regionkey AND l_suppkey = s_suppkey AND s_nationkey =
ns.n_nationkey)
)

SELECT DISTINCT c_name, c_phone, r_name
FROM custkeys, customer, nation, region
WHERE custkeys.c_custkey = customer.c_custkey AND c_nationkey = n_nationkey AND
n_regionkey = r_regionkey
```

6-
```
SELECT MAX(l_extendedprice)
FROM lineitem
WHERE l_discount > l_tax
```

7-
```
WITH timelyorders AS (
(SELECT DISTINCT o_orderkey AS orderkey
FROM orders)
EXCEPT
(SELECT DISTINCT l_orderkey AS orderkey
FROM lineitem
WHERE DATEDIFF(day, l_shipdate, l_receiptdate) > 14)
)

SELECT COUNT(orderkey) FROM timelyorders;
```

8-
```
WITH requiredcustomers AS (
(SELECT c_custkey FROM customer)
EXCEPT
(SELECT DISTINCT o_custkey
FROM lineitem, orders, supplier, nation
WHERE l_orderkey = o_orderkey AND l_suppkey = s_suppkey AND s_nationkey = n_nationkey
AND n_name = 'UNITED STATES')
)

SELECT COUNT(*) FROM requiredcustomers;
```

9-
```
SELECT n_name
FROM customer, nation
WHERE c_acctbal = (SELECT MAX(c_acctbal) FROM customer) AND c_nationkey = n_nationkey;
```

10-
```
SELECT DISTINCT n_name
FROM lineitem, orders, customer, supplier, nation
WHERE l_orderkey = o_orderkey AND o_custkey = c_custkey AND c_nationkey = n_nationkey
AND l_suppkey = s_suppkey
AND s_nationkey = c_nationkey
AND DATEDIFF(day, l_shipdate, l_receiptdate) > 29
```

CHINOOK

11-
```
(SELECT artistId, name FROM artist)
EXCEPT
(SELECT artist.artistId, artist.name FROM artist, album WHERE artist.artistId = album.artistId)
```

12-
```
(SELECT artistId, name FROM artist)
EXCEPT
(SELECT artist.artistId, artist.name
FROM artist, album, track, genre
WHERE artist.artistId = album.artistId AND album.albumId = track.albumId AND track.genreId =
genre.genreId AND genre.name = 'Latin')
```

13-
```
SELECT trackId, track.name
FROM track , mediaType
WHERE milliseconds =
(SELECT MAX(milliseconds) FROM track, mediaTypeId AND track.mediaTypeId  =
mediaType.mediaTypeId AND mediaType.name LIKE '%video%')
AND track.mediaTypeId  = mediaType.mediaTypeId AND mediaType.name LIKE '%video%';
```

14-
```
SELECT firstname, lastname
FROM customer
WHERE city = (SELECT city FROM employee WHERE reportsTo IS NULL);
```

15-
```
WITH managersOfSuppBraz AS (
SELECT DISTINCT reportsTo AS manId
FROM employee, customer
WHERE employeeId = supportRepId AND customer.country = 'Brazil')

SELECT employeeId, firstname, lastname
FROM employee e, managersOfSuppBraz m
WHERE e.employeeId = m.manId
```

16-
```
SELECT COUNT(t.trackId), SUM(l.unitprice)
FROM invoiceLine l, invoice i, customer c, track t, mediaType m
WHERE l.invoiceId = i.invoiceId AND i.customerId = c.customerId AND c.country = 'Germany'
AND l.trackId = t.trackId AND t.mediaTypeId = m.mediaTypeId AND m.name  LIKE '%audio%'
```

17-
```
(SELECT playlistId, name FROM playlist)
EXCEPT
(SELECT p.playlistId, p.name
FROM playlist p, playlistTrack pt, track t, genre g
```

WHERE p.playListId = pt.playListId AND pt.trackId = t.trackId AND t.genreId = g.genreId AND g.name = 'Latin')

18- SELECT SUM(bytes), SUM(unitprice)
FROM playlist p, playlistTrack pt, track t
WHERE p.name = 'Grunge' AND p.playListId = pt.playListId AND pt.trackId = t.trackId

19- (SELECT playlistId, name FROM playlist)
EXCEPT
(SELECT p.playlistId, p.name
FROM playlist p, playlistTrack pt, track t, album b, artist a
WHERE p.playListId = pt.playListId AND pt.trackId = t.trackId AND t.albumId = b.albumId AND b.artistId = a.artistId AND (a.name = 'Black Sabbath' OR a.name = 'Chico Buarque'))

20- SELECT c.name, c.country
FROM customer c, employee e
WHERE c.supportRepId = e.employeeId AND DATEDIFF(year, birthdate, hiredate) < 35

RELATIONAL ALGEBRA

$$Q1)\ \pi_{\text{c_name}}(\sigma_{\text{acctbal=9000}\wedge\text{mktSegment = 'HOUSEHOLD'}}(\text{customer}))$$

$$Q2)\ \pi_{p_partkey,p_name}\sigma_{r_name='MIDDLEEAST'}(\\ partsupp \bowtie_{ps_suppkey=s_suppkey} part \bowtie_{p_partkey=ps_partkey}(\\ supplier \bowtie_{s_nationkey=n_nationkey}(nation \bowtie_{n_regionkey=r_regionkey} region))$$

$$Q4)\ \pi_{p_partkey,p_name}(part) - (\\ \pi_{p_partkey,p_name}\sigma_{r_name='EUROPE'}(\\ partsupp \bowtie_{ps_suppkey=s_suppkey} part \bowtie_{p_partkey=ps_partkey} supplier\\ \bowtie_{s_nationkey=n_nationkey} nation \bowtie_{n_regionkey=r_regionkey} region))$$

$$Q5)\ s = supplier \bowtie_{s_nationkey=n_nationkey} \rho(nation, ns)\\ c = customer \bowtie_{c_nationkey=n_nationkey} \rho(nation, nc)\\ l = c \bowtie_{c_custkey=o_custkey} orders \bowtie_{o_orderkey=l_orderkey} lineitem \bowtie_{l_suppkey=s_suppkey} s\\ k = \pi_{c_custkey}(customer) - \pi_{c_custkey}(\sigma_{nc.n_regionkey\neq ns.n_nationkey}(l))\\ \pi_{c_name,c_phone,r_name}(k \bowtie customer \bowtie_{c_nationkey=n_nationkey} nation \bowtie_{n_regionkey=r_regionkey} region)$$

$$Q10)\ t = lineitem \bowtie_{l_orderkey=o_orderkey} orders \bowtie_{o_custkey=c_custkey} customer\\ \bowtie_{l_suppkey=s_suppkey\wedge c_nationkey=s_nationkey} supplier \bowtie_{c_nationkey=n_nationkey} nation\\ \pi_{n_name}(\sigma_{DATEDIFF(day,l_shipdate,l_receiptdate)>29}(t))$$

$$Q11)\ \pi_{artistId}(artist) - \pi_{artist.artistId,artist.name}(artist \bowtie album)$$

$Q14)\ \pi_{firstname,lastname}(\sigma_{ISNULL(reportsTo)}(\ customer \bowtie_{customer.city=employee.city} employee))$

$Q15)\ mbraz = \pi_{reportsTo}(\sigma_{customer.country='Brazil'}(customer \bowtie_{supportRepId=employeeId} employee))$
$\pi_{employeeId,firstname,lastname}(employee \bowtie_{employeeId=mbraz.reportsTo} mbraz)$

$Q20)\ \pi_{c.firstname,c.lastname,c.country}(\sigma_{DATEDIFF(year,birthdate,hiredate)<35}($
$\rho(customer, c) \bowtie_{supportRepId=employeeId} \rho(employee, e)))$

Note: Full list of RA-expressible queries

1, 2, 4, 5, 10
11, 12, 14, 15, 17, 19, 20