

## Quiz 3 Answers, Fall 2018

**Question (Points: a-12 b-13).** You are given the following data model for elections:

```
Parties(name, url, description, foundedon)
Elections(id, name, etype, state, howoften)
Person(id, fname, lname, bio, birthday)
Candidates(personid, eid, year, partyname, ballotposition, numvotes)
```

Keys are underlined. There are many **parties** (even though some small) and many **elections**. Each election has a **name** and a **etype**. **elections.etype** is either 'state' or 'federal'. For state elections there is a state listed (e.g. 'NY'. Attribute **elections.howoften** lists how many years this election occurs regularly.

People run as candidates for different elections, which is stored in the **Candidates** relation. Each candidate runs for a specific party. If they are independent, **candidates.partyname** is NULL. Ballotposition is a number (1,2,3) that shows where they appear on the ballot. If they are not on any ballot (write-in candidate), then ballotposition is zero.

Write the following queries using SQL:

- (a) For each party, return the party name total number of years that they ran in non-federal election (i.e. had a candidate) and the number of distinct candidates in non-federal elections.

**Answer here.**

```
select
    p.name
    , count(distinct c.year)
    , count(distinct c.personid)
from
    parties p
    join elections e on e.etype <> 'federal'
        --note the condition on e.etype can also in the WHERE clause
    left join candidates c on c.eid=e.id and p.name=c.partyname
group by
    p.name ;
```

Equivalent left joins:

```
from
    parties p
    left join candidates c on p.name=c.partyname
    left join elections e on c.eid=e.id and e.etype <> 'federal'

--- This one requires that there is at least one election in the database
from
    parties p
    left join candidates c on p.name=c.partyname
    join elections e on (c.eid is null or c.eid=e.id) and e.etype <> 'federal'
```

Alternative answer:

```
select
  p.name
  , (select count(distinct year) from candidates c
      where c.partyname=p.name and c.eid =e.id and e.etype<>'federal')
  , (select count(distinct personid) from candidates c
      where c.partyname=p.name and c.eid =e.id and e.etype<>'federal')
from
  parties p;
```

The following answer is partially correct because it will not return parties with no candidates in federal elections.

```
select
  p.name
  , count(distinct c.year)
  , count(distinct c.personid)
from
  parties p
  , elections e
  , candidates c
where
  e.etype <> 'federal'
  and c.eid=e.id
  and p.name=c.partyname
group by
  p.name ;
```

- (b) For each candidate, return their name and the last year they ran for office and the number of votes they got in this election (assume a single election per candidate in a given year).

**Answer here.**

```
select
  p.fname
  , p.lname
  , c.year
  , c.numvotes
from
  candidates c
  , person p
where
  p.id = c.personid
  and c.year = (select max(c2.year)
                from candidates c2 where c2.personid=c.personid);
```

Alternatives:

```

select
    p.fname
    , p.lname
    , c.year
    , c.numvotes
from
    candidates c
    , person p
where
    p.id = c.personid
    and c.year >=ALL
        (select c2.year
         from candidates c2 where c2.personid=c.personid);

```

```

select
    p.fname
    , p.lname
    , c.year
    , c.numvotes
from
    candidates c
    , person p
where
    p.id = c.personid
    and NOT EXISTS
        (select c2.year --does not matter what you return here
         from candidates c2 where c2.personid=c.personid and c2.year>c.year);

```

```

select
    p.fname
    , p.lname
    , c.year
    , c.numvotes
from
    candidates c
    join person p on p.id=c.personid
    left join candidates c2 on c2.personid=c.personid and c2.year>c.year
where
    c2.personid is null;

```