For Relational Algebra

1. $\pi_{first\_name, middle\_initial, last\_name}(\sigma_{appointed\_date \geq '2020-03-15'}(data\_officer))$

2. We can't write this as RA because this one involves percentage, which needs 2 counts at the same time.

3. Assume $\pi_{O2.appointed\_date}(\sigma_{O1.appointed\_date > O2.appointed\_date}(data\text{-}officer\ O1 \bowtie data\text{-}officer\ O2))$ is RA1

we have
$\pi_{O1.first\_name, O1.middle\text{-}initial, O1.last\text{-}name}(data\text{-}officer\ O1 - RA1)$

4. Assume we have data-allegation a1, a2, a3

$\pi_{id, first\text{-}name, last\text{-}name}(\sigma_{a1.allegation\_id < a2.allegation\_id \wedge a2.allegation\_id < a3.allegation\_id}(a1 \bowtie a2 \bowtie a3))$

5. We can't write this as RA because it has count and sum for per-capita calculation

6.

$$\pi_{a1.officer\_id,\ a2.officer\_id,\ o1.last\_unit\_id,\ o2.last\_unit\_id}\Big(\sigma_{a1.allegation\_id = a2.allegation\_id \wedge a1.officer\_id < a2.officer\_id \wedge o1.last\_unit\_id \,!= o2.last\_unit\_id}\big(\sigma_{a1.officer\_id = o1.id}(officerallegation\ a1 \times officer\ o1)\big) \bowtie \big(\sigma_{a2.officer\_id = o2.id}(officerallegation\ a2 \times officer\ o2)\big)\Big)$$

(RA1)

7.
we can't write this as RA because it has count and group by at the same time.

8.

Assume

$$\pi_{o2.rank,\ o2.sustained\_count}(\sigma_{o1.sustained\_count > o2.sustained\_count}(data\_officer\ o1 \bowtie data\_officer\ o2))$$ is RA1

We have

$$\pi_{rank,\ sustained\_count}(data\_officer - RA1)$$

9. we can't write this as RA because it has count for sustained and exonerated for each year.

10. we can't write this as RA because it has count and group by at the same time.