**PROBLEM 3**

Grain size calculation:

* Franchises
  + 350 franchises for merchandise sales
* Items
  + Merchandise: 500
  + MemberType: 10
  + ServCat: 20
  + Total: 530
* Customers
  + Members: 50000 members in the retail database
  + Corporate customers: 150\*200=30000
  + Total customers: 80000
* Fact table size
  + Merchandise purchases: 450000
  + Service purchases: 100000
  + Special events: 300\*200=60000
  + Total: 610000
* Sparsity estimate:
  + 1 - ( fact table size / product of dimensions )
  + 1 – (610000/(350\*530\*365\*80000) ) = 0.999999887

The data cube has mostly missing cells with slightly more than 1% of cells with non zero values