This exercise complements initial classroom discussion of data cubes based on the paper\textsuperscript{1} introducing them, and the textbook.\textsuperscript{2}

1. List the members of your group below. Underline your name.

2. The abstract refers to SQL aggregation queries producing zero- or one-dimensional aggregates. Is there a simple test to determine which? Explain.

3. Describe how the enhanced aggregation functions on page 33 of the paper may be expressed in current standard SQL. [Hint: Recall the examples from the AQuery paper.\textsuperscript{3}]

4. Explain the comment on “creating $2^N$ aggregation columns” (bottom of page 34) in the context of the example of Table 3. Generalize.

\textsuperscript{1}Jim Gray et al., “Data Cube: A Relational Aggregation Operator Generalizing Group-By, Cross-Tab, and Sub-Totals,” \textit{Data Mining and Knowledge Discovery} 1 (1997).


\textsuperscript{3}Alberto Lerner and Dennis Shasha, “AQuery: Query Language for Ordered Data, Optimization Techniques, and Experiments,” in \textit{Proceedings of the 29th International Conference on Very Large Data Bases (VLDB)} (Berlin, Germany, 2003).
5. Explain how to produce a spreadsheet table analogous to Table 4 using OpenOffice Calc.

6. Depict a likely mapping of the query of page 36 to logical and physical plans. Later, compare your work with the plans generated by PostgreSQL.

7. Provide a precise description of the query mentioned in the penultimate paragraph of Section 2 (page 38).

8. Devise and perform experiments to evaluate the claims made in the last paragraph of Section 2 on a current SQL implementation.