

A. OLAP and Data Warehouse

Consider the following query

```
SELECT Item, Brand, MonthSold, Color, SUM(Quantity) AS Sold
FROM Sales
WHERE Price <= 100
AND Color IN {'red', 'pink', 'blue'}
AND Year >= 2010
GROUP BY Item, Brand, MonthSold, Color
```

and the corresponding result shown below as a table:

Item	Brand	MonthSold	Color	Sold
Socks	K7	Oct 2010	red	10
Jeans	Denis	Nov 2011	pink	15
Shoes	K7	Mar 2012	red	5
Sunglasses	Raysun	Oct 2010	blue	20
Shoes	Denis	Nov 2011	blue	25

- 1) Suppose the query is extended with the WITH CUBE clause.
 - a. How many different kinds of aggregation (with the **all** polymorphic value) will be applied by the execution engine?

Indicate your answer here: _____

Explain:

- b. Is the result of the query necessarily a superset of the table shown above?
- ☐ YES, STRICTLY
 - ☐ NO
 - ☐ YES, BUT NOT STRICTLY (IT MAY ALSO BE THE SAME AS THE TABLE ABOVE)

- 2) Suppose now the query is extended with the **WITH ROLLUP** clause.
 - a. How many different kinds of aggregation (with the **all** polymorphic value) will be applied by the execution engine?

Indicate your answer here: _____

- b. Show the result by filling in the table below (the cells below are drawn for your convenience, but you do not necessarily have to fill all the rows)

[illegible]

[illegible]