Study Questions 2

1) Consider the following SQL statements:

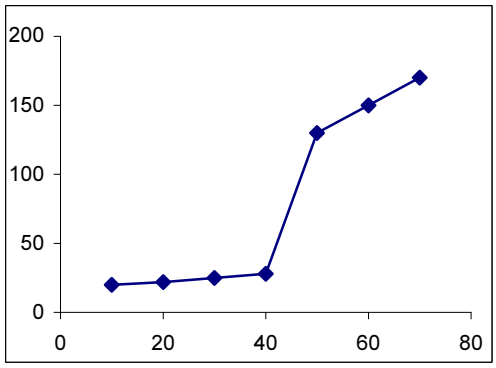
```
CREATE TABLE point(x float, y float);

CREATE INDEX point_index(x, y);

SELECT *
  FROM point
 WHERE 5 < x AND x < 10
   AND 10 < y AND y < 20;
```

This is an example of a 2-dimensional "window query, " as described in Section 2.3.1(c). The statements above create a table for storing 2-dimensional points and an ordinary B-Tree index on attributes "x" and "y."

Can the index improve performance for the query? If so, why do we need "multidimensional access methods"?

2) In Section 2.4.1, the author mentions "space-filling curves." Explain how a space-filling curve and an ordinary B-Tree can be used in place of the access methods described in the paper. (Cite your sources if you need to do some research on space-filling curves.)

3) As you insert points into a Grid file structure, the data structures involved get larger and larger. Imagine that the following graph displays query response time for a Grid file as a function of the number of points inserted.



Offer a possible explanation of the sudden slowdown in query response time once 40k points are inserted.

4) Imagine you are given a set of rectangles, and you insert them into an R-Tree. If the rectangles were provided in a different order, would the R-tree be different? Explain why or why not.