**Complexity Analysis**

The QuadTree operates in O(log n) logarithmic time due to how numbers or data points are ordered and compared. In the case of adding or inserting, the QuadTree operates at O(n) linear time.

**Functions**

**def newid** – returns a new and unused ID  
**def initiate** – initializes length and vertices   
**def isexternal** – determines if node is external  
**def isinternal** – determines if node is internal  
**def isempty** – determines if node is empty  
**def addbody** – adds a body to the QuadTree  
**def node\_state** – determines if the node will fit in the body  
**def split** – splits node, divides into four quadrants and redistributes if necessary  
**def connect** – attaches body to host node  
**def generate** – generate node IDs through   
**def update**- update QuadTree  
**def summarize** – encapsulates printing methods  
**def report** – prints results to both console and driver.py file   
**main** - main program that initializes the QuadTree, sets upper and lower limits, adds bodies and calls summary to print the report.