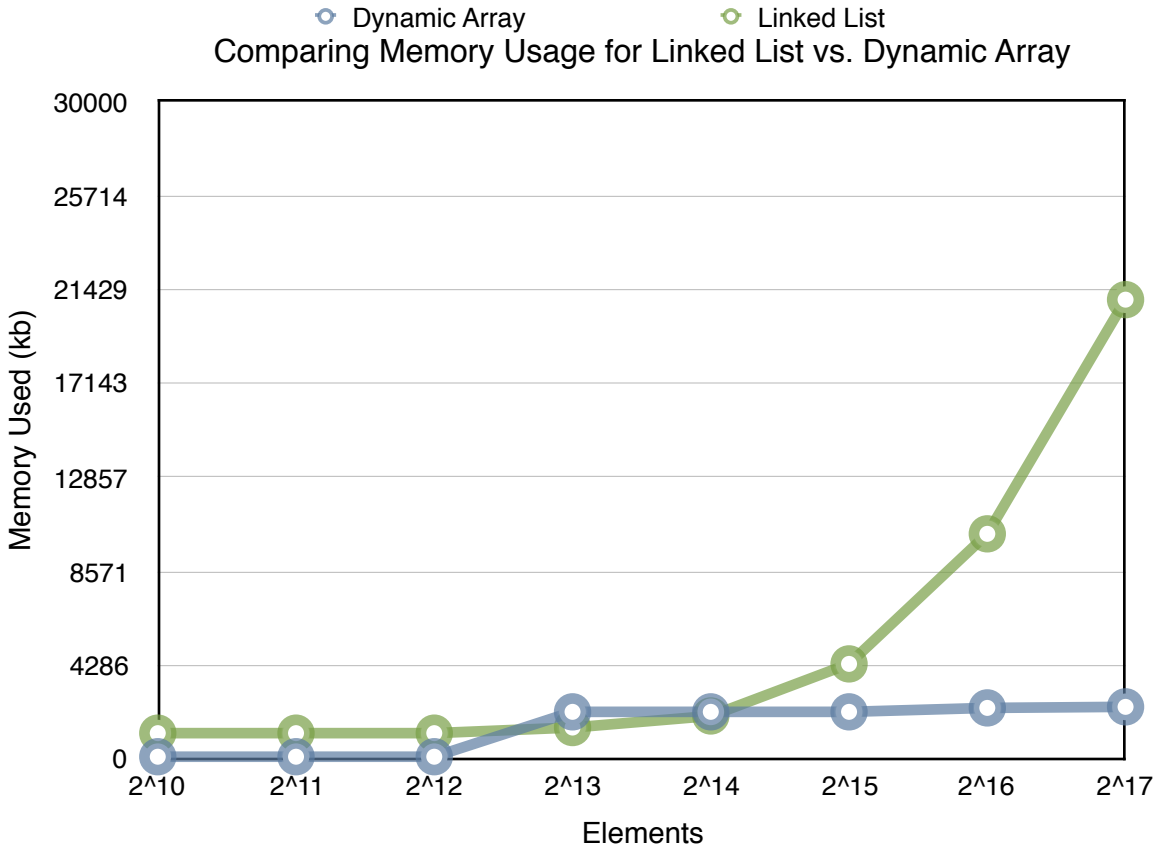
Problem 2 - Performance Comparison

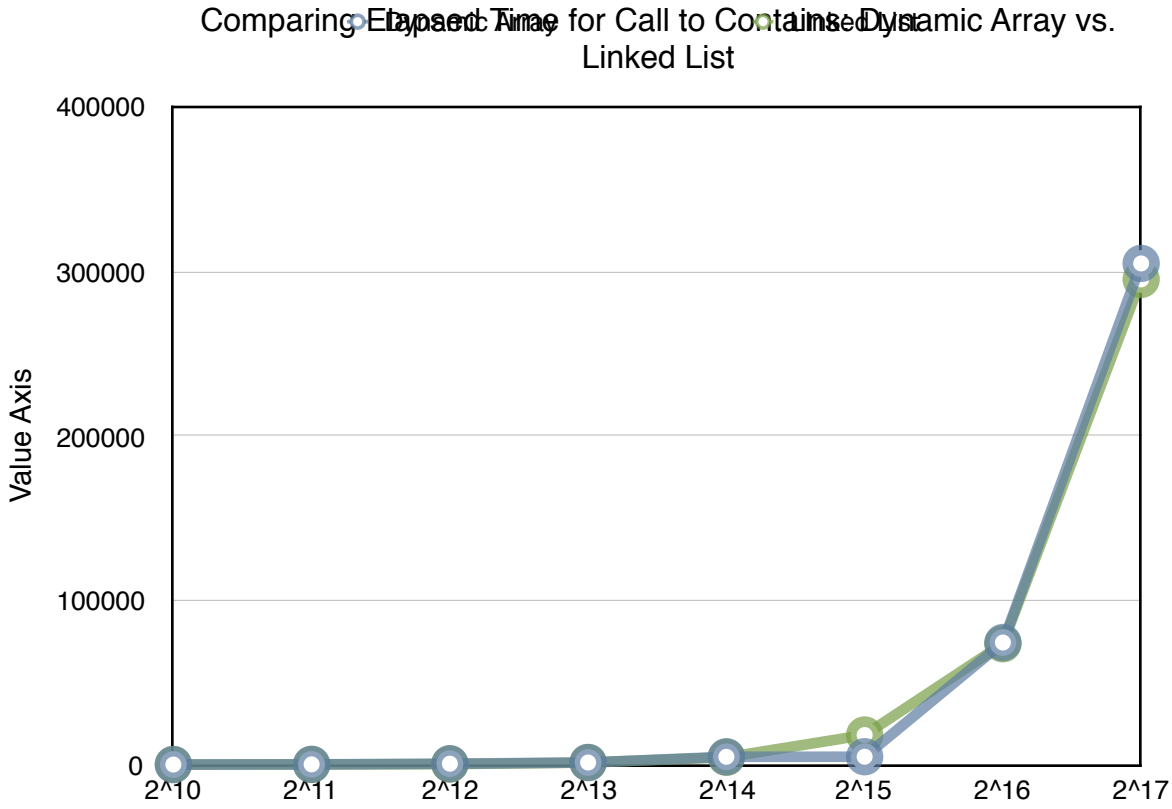
Memory Used (kb)

N Elements	Dynamic Array	Linked List
2^10	104	1180
2^11	104	1180
2^12	104	1180
2^13	2152	1436
2^14	2152	1964
2^15	2152	4340
2^16	2332	10276
2^17	2380	20964

Time for call to contains (ms)

N Elements	Dynamic Array	Linked List
2^10	40	40
2^11	140	70
2^12	560	290
2^13	1260	1250
2^14	4750	4440
2^15	4790	18000
2^16	74280	73510
2^17	304970	295260





1. The linked list holds uses memory because each node contains both values and pointer references to other nodes. The dynamic array holds contains the values in one piece of connected memory.
2. While both run at time complexity of O(n), the dynamic array should execute faster because it is faster to traverse a continuous piece of memory versus traversing through linked nodes that require calling pointer references to access the next block of memory.
3. Linked list would be much faster because unlike a dynamic array, when an element is removed, the rest of the array does not need to shift to compensate for the empty space. If a node in a linked list is removed you must only connect the adjacent nodes to each other and then remove that node.