Matthew Soicher
z5160737

Question 2

We have two arrays,

$$A = n \text{ nuts}$$
$$B = n \text{ bolts}$$

Take a nut, A_n from A and check for a match amongst B.

While we do this, we simultaneously sort B into two arrays:
B_{larger} – the bolts that are too large for the nut A_n and
$B_{smaller}$ – the bolts that are too small for the nut A_n.
Time Complexity: $O(n)$

From the bolt we have found, call it B_n, we compare it against every nut in A, again sorting it into two arrays.
A_{larger} – the nuts that are too large for B_n and
$A_{smaller}$ – the nuts that are too small for B_n

Put this pair of A_n and B_n into our found array, call it F.

Recursively call the function with inputs (A_{larger}, B_{larger}) and ($A_{smaller}$, $B_{smaller}$)
Time Complexity: $O(\log n)$

Thus, a total time complexity of*:* $O(n \log n)$