For each of the following statement, say if (a) the statement is always true, (b) the statement is sometimes true, or (c) the statement is never true. For example, if \( f(n) \) is in \( O(n^2) \), \( f(n) \) is always in \( O(n^2 + n) \), \( f(n) \) is sometimes > \( n^2 \), and \( f(n) \) is never in \( \Omega(n^3) \). Assume \( B(n) \), \( A(n) \) and \( W(n) \) are the best, average and worst case time, respectively, for the algorithm.

Suppose \( B(n) \) for an algorithm is in \( O(n) \), that \( A(n) \) is in \( \Theta(n \lg n) \) and that \( W(n) \) is in \( \Omega(n^2) \).

a. \( A(n) \in O(n) \)

b. \( B(n) \in O(\sqrt{n}) \)

c. \( W(n) \in \Omega(2^n) \)

d. \( W(n) \in \Omega(n) \)

e. \( W(n) \in n^2 + o(n^2) \)

Now, suppose, instead of the assumption above, that \( A(n) \) is in \( O(n^2) \) and that \( W(n) \) is in \( \omega(n \lg n) \).

f. \( W(n) \in \Omega(n^2) \).

g. \( A(n) \in O(n \lg n) \).

h. \( B(n) \in O(n^2 \lg n) \).

i. \( A(n) \in \Theta(n) \).

j. \( W(n) \in \Theta(n \lg n) \).