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Theo.Ass. 1

4.) Pseudocode.

```
q4 (A, a, b, c) {
    l ← 0 ;
    r ← m-1 ;   flag ← 0 ;        /(m = size of array A)
    while (l < r) {
        if ( a^2 == b A[l] + c A[r] ) {
            flag ← 1 ;   break ;
        } else if ( a^2 > b A[l] + c A[r] ) {
            l ++
        } else if ( a^2 < b A[l] + c A[r] ) {
            r --
        }
    }
    return flag
}
```

algo: l is left pointer r is right pointer at each iteration until $l < r$ we check if the given condition holds, if it holds we return 1 else we check the value of a^2 and $b A[l] + c A[r]$ if a^2 is greater we increment l else we ~~...~~ decrement r by 1. we increment l to ↑ the value of $b A[l] + c A[r]$ as all other parameters are fixed, similarly we decrement r to ↓ the value of $b A[l] + c A[r]$ as all other parameters are fixed.

time complexity : $O(m)$.

Proof of correctness :

lets suppose we haven't find the solution and we are running i^{th} iteration

$$b A[l+i] + c A[r-i] \neq a^2$$

lets see $(i+1)^{st}$ iteration, we can have 3 cases

C I : $b A[l+i] + c A[r-i] > a^2$.

$\therefore$ we need to decrease the value of LHS this could be done by only decrementing $(r-i)$ to $(r-i-1)$ as we have already checked left of l & right of r for no soln and value can only be decreased by taking a number left of $(r-i)$.

C II : $b A[l+i] + c A[r-i] < a^2$

by similar analogy we need to $\uparrow$ the value of LHS by $\uparrow$ $(l+i)$ to $(l+i+1)$

after this if we find LHS = RHS then we can say we got the soln else ~~not need~~ the algo will search further.