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0.0.1 Problem (Bentley)

Given numbers $a_1 ... a_n$, find a contiguous subsequence ("block") s.t. largest sum.

```
In [1]: # O(N^3)
        def largest_block_sum1(numbers):
            best = 0
            n = len(numbers)
            for i in range(n):
                for j in range(i+1, n):
                    total = 0
                    for k in range(i, j):
                        total += numbers[k]
                    best = max(best, total)
            return best

        # O(N^2)
        def largest_block_sum2(numbers):
            best = 0
            n = len(numbers)
            for i in range(n):
                total = 0
                for j in range(i, n):
                    total += numbers[j]
                    best = max(best, total)
            return best

        # O(N log N)
        # divide and conquer
        def largest_block_sum3(numbers):
            if len(numbers) == 0:
                return 0
            elif len(numbers) == 1:
                return max(0, numbers[0])

            n = len(numbers)
            midpoint = n / 2
            subproblems = max(largest_block_sum3(numbers[:midpoint]),
```

```
                                largest_block_sum3(numbers[midpoint:]))  # copies 'ca

            right = 0
            current = 0
            for i in range(midpoint, n):
                current += numbers[i]
                right = max(right, current)

            left = 0
            current = 0
            for i in range(midpoint - 1, -1, -1):
                current += numbers[i]
                left = max(left, current)

            return max(subproblems, left + right)

        # O(N)
        def largest_block_sum4(numbers):
            best = 0
            current = 0
            for number in numbers:
                current = max(current + number, number)
                best = max(best, current)
            return best
```

In [2]:
```
test_array = [1, -6, 3, -1, 4, 2, -3, 2]

assert largest_block_sum1(test_array) == 8
assert largest_block_sum2(test_array) == 8
assert largest_block_sum3(test_array) == 8
assert largest_block_sum4(test_array) == 8
```