# 1043 Partition Array of maximum Sum

arr = | 1 | 4 | 1 | 5 | 7 | 3 | 6 | 1 | 9 | 9 | 3 |

K = 4

memo[i] ⇒ optimal sum for arr[0:i]

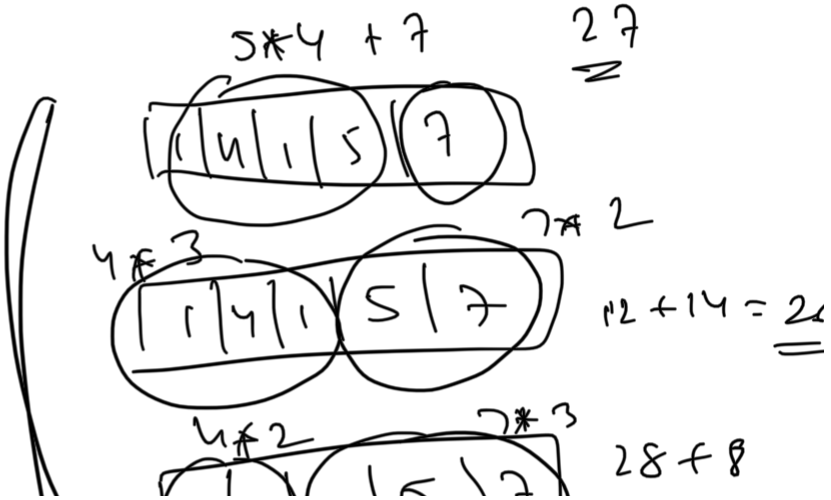
memo[0] = arr[0]

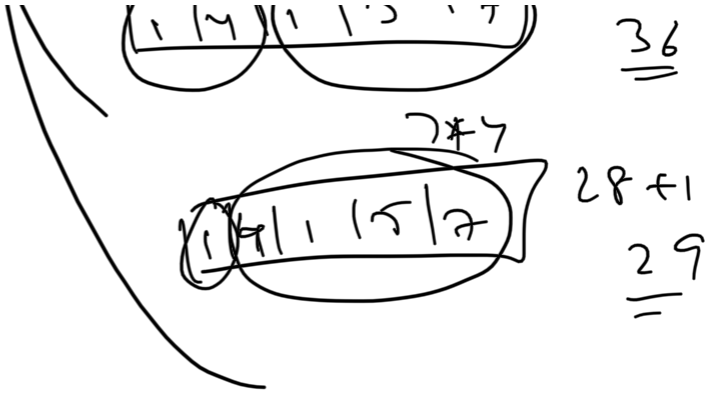
memo[1] = max(arr[0], arr[1]) * 2

memo[2] = max(arr[0], arr[1], arr[2]) * 3

memo[3] = max(arr[0], arr[1], arr[2], arr[3]) * 4

memo[5] = MAX






$$memo[5] = \max(27, 26, 36, 29) = 36$$

In general

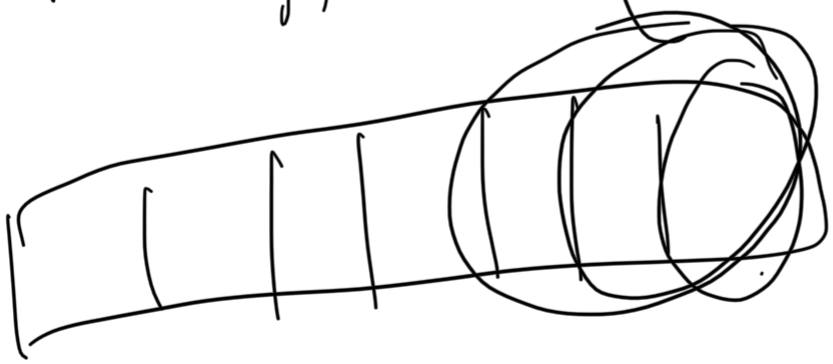
$$memo = [-1] * len(arr)$$

$$memo[0] = arr[0]$$

Initialize first K items

for y in (1, K):

memo(y) = max(arr[i:y+1]) * (y+1)



last element added could be alone, group of 2, group of 3, .. group of K

memo[i] = for $0 \le z \le K$ max( max(arr[i-z:i]) * z, fmem-[i-z] )