Rod Cutting Problem

Problem Statement

Suggest Edit

Given a rod of length 'N' units. The rod can be cut into different sizes and each size has a cost associated with it. Determine the maximum cost obtained by cutting the rod and selling its pieces.

Note:

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1. The sizes will range from 1 to 'N' and will be
integers.

2. The sum of the pieces cut should be equal to 'N'.

3. Consider 1-based indexing.
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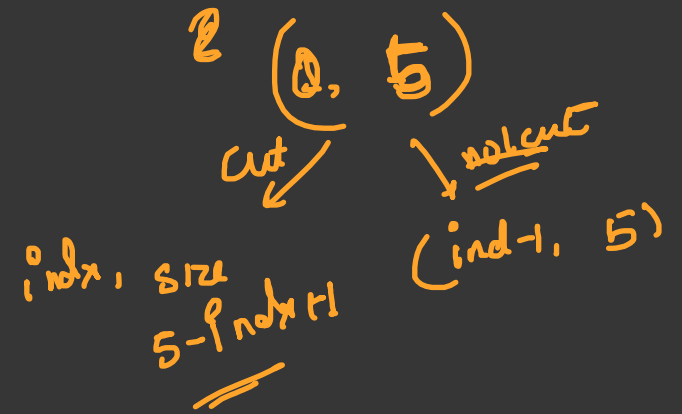
Sample input:

$\{2, 5, 7, 8, 10\}$

$\underline{1} \quad \underline{2} \quad \underline{3} \quad \underline{4} \quad \underline{5}$

$1 + 1 + 1 + 1 + 1$

$2 + 2 + 2 + 2 + 2, \underline{10} \rightarrow Cost$

maximum cost

Approach :

$\{ 2, 5, 7, 8, 10 \} \rightarrow Price$

We have 2 option: cut the rod in the size or not.

2	5	7	8	10	$\rightarrow$ Price
1	2	3	4	5	$\rightarrow$ Size

Not cut

we know size N

$\beta \; f(\, indx, \; N)$

$price[i] +$ _____

$(0, 5)$

cut / not cut

indx, size
5 - index + 1   (ind-1, 5)

Base Case $if (i == n - 1)$

$if (\, size == 0 \; or \; i == 0) \quad 0 ;$ if not $\rightarrow$ 4

remain price   take ($i <= 5$)

Recursion function:

$f(indx, N)$

$$\boxed{2} \quad N = 0$$
$$1 \quad N = \text{anything}$$

$if(indx == 0)$
$\qquad return \ N \times price[0],$ $\Big\}$ base case is important

$int \ not \ take = 0 + f(indx-1, N),$

$intake = QNT\_MIN,$

$if(indx+1 <= N) \quad take = price[i] + f(indx, N-indx+1),$

$return \ max(notake, take),$