

Q- A vessel is to be loaded with stocks of 3 items.

Each unit of item i has a weight w_i and value v_i .

The maximum cargo weight the vessel can take is 5 and the details of the three items are as follows:

i	w_i	v_i
1	1	30
2	3	80
3	2	65

Find the most valuable cargo load without exceeding the maximum cargo weight by using dynamic programming.

Solution:

The maximum cargo load is restricted to 5 Kg.

How many units of each item be loaded to maximize the value.

Cargo Load problem :

Stage I : $w_1 = 1 \text{ Kg/unit}$, $P_1 = 30 \text{ RS/unit}$

$$\text{No. of units} = \frac{W}{w_1} = \frac{5}{1} = 5 \text{ units}$$

Stage II : $w_2 = 3 \text{ Kg/unit}$, $P_2 = 80$

$$\text{No. of units} = \frac{W}{w_2} = \frac{5}{3} \approx 1$$

Stage III :

$w_3 = 2 \text{ Kg/unit}$, $P_3 = 65$

$$\text{No. of units} = \frac{5}{2} \approx 2$$

x_i	Stage 1 $w_1 = 1$, $P_1 = 30$	Stage 2 $w_2 = 3$, $P_2 = 80$	Stage 3 $w_3 = 2$, $P_3 = 65$	$f_i^*(x_i)$
0	0	0	0	0
1	30*	0	0	30
2	60	0	2	65*
3	90	3	3	65+30=95*
4	120	4	4	65+65=130*
5	150	5	5	65+65+30=160*
	1 unit of $w_1 \Rightarrow x_1^* = 1$			
	2 unit of $w_3 \Rightarrow x_3^* = 2$			
		$x_2^* = 0$		
			Max = 160	
			Value of load	