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K

Quiz #4

★ An overhead trolley conveyor;

$$\left. \begin{aligned} f_1(n) &= (1, 0, 0) \\ f_2(n) &= (0, 2, 0) \\ f_3(n) &= (0, 0, 1) \\ f_4(n) &= (0, -4, 0) \end{aligned} \right\}$$

There are 79 carriers on the conveyor. Determine the carrier capacity?

1, 2, and 3 are loading stations, 1pt
4 is unloading station.

$k/p = 79/3$ not an integer ✓ 3pts.
 $p = 3$, a prime number ✓
 $k \bmod p = 79 \bmod 3 = 1$; $1/p = 1/3$ is a proper fraction ✓

$F_1(n) = (1, 0, 0) + (0, 2, 0) + (0, 0, 1) + (0, -4, 0) = (1, -2, 1)$ 1pt

Let $H_1^*(1) = 0 \Rightarrow H_1^*(2) = H_1^*(1) + F_1(2) = 0 + (-2) = -2$ 3pts
 $H_1^*(3) = H_1^*(2) + F_1(3) = -2 + 1 = -1$

$\Rightarrow H_1^*(n) = (0, -2, -1) \Rightarrow H_2^*(n) = (0, -2, -1) - (1, 0, 0) = (-1, -2, -1)$ 3pts
 $\Rightarrow H_3^*(n) = (-1, -2, -1) - (0, 2, 0) = (-1, -4, -1)$
 $\Rightarrow H_4^*(n) = (-1, -4, -1) - (0, 0, 1) = (-1, -4, -2)$

$$C = \min H_i^*(n) = -4 \text{ (2pt)}$$

$$H_1(n) = (4, 2, 3)$$

$$H_2(n) = (3, 2, 3)$$

$$H_3(n) = (3, 0, 3)$$

$$H_4(n) = (3, 0, 2)$$

(4pt)

$$B = \max H_i(n) = 4 \text{ (2pt)}$$

\therefore Each carrier should have a capacity of 4 units. (1pt)