Question

A store is having a special sale on designer soaps. For every three bars of soap purchased, one is given for free. The bars of soap cost $2 each, and there is a limit of 8 bars of soap per customer (including free ones).

a. Write a piecewise defined function C (b) that gives the total cost C for b bars of soap.

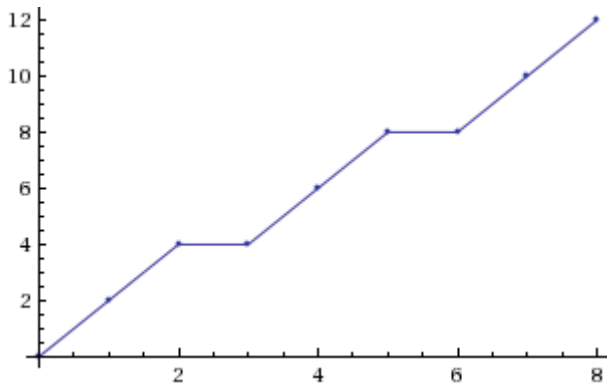**b.** Write the domain for this function in terms of the context.

Solution

a. The total cost C for b bars of soap is given by
$C(0) = 0, C(1) = 2, C(2) = 4, C(3) = 4, C(4) = 6, C(5) = 8, C(6) = 8, C(7) = 10,$
$C(8) = 12$

The expression of $C(b)$ is equivalent to

$$C(b) = \begin{cases} 2b, \text{if } b = 0, b = 1, b = 2, \\ 2b - 2, \text{if } b = 3, b = 4, b = 5, \\ 2b - 4, \text{if } b = 6, b = 7, b = 8; \end{cases}$$

b. Domain is $Dom(C) = \{0; 1; 2; 3; 4; 5; 6; 7; 8\}$. It is the set of all the values that go into a function $C(b)$.