

Exercise 5.1.61 The number N of cars produced at a certain factory in one day after t hours of operation is given by $N(t) = 100t - 5t^2$ for $0 \leq t \leq 10$. If the cost C (in dollars) of producing N cars is $C(N) = 15,000 + 8,000N$, find the cost C as a function of the time t of operation of the factory.

Solution.

To find cost as a function of t , we compose function C (as a function of N) with function N (as a function of t) to get

$$\begin{aligned}(C \circ N)(t) &= C(N(t)) = C(100t - 5t^2) \\ &= 15,000 + 8,000(100t - 5t^2)\end{aligned}$$

$$= \boxed{15,000 + 800,000t - 40,000t^2} \text{ (dollars).} \quad \square$$

Notice that the domain of this function is $0 \leq t \leq 10$, or $t \in [0, 10]$.