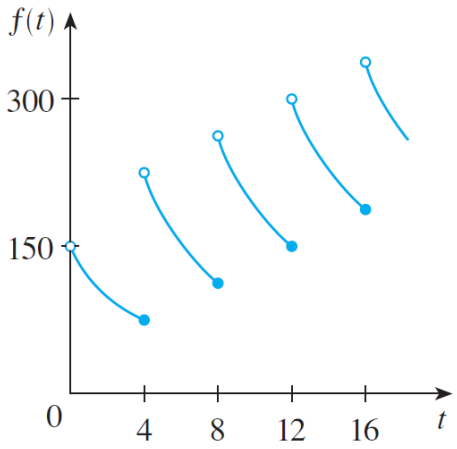
Exercise 10

A patient receives a 150-mg injection of a drug every 4 hours. The graph shows the amount $f(t)$ of the drug in the bloodstream after t hours. Find

$$\lim_{t \to 12^-} f(t) \qquad \text{and} \qquad \lim_{t \to 12^+} f(t)$$

and explain the significance of these one-sided limits.



Solution

The left-hand and right-hand limits are

$$\lim_{t \to 12^-} f(t) = 150$$

$$\lim_{t \to 12^+} f(t) = 300.$$

Once the 12th hour comes, an injection raises the amount of drug in the blood by 150 mg. Slightly before the 12th hour, the amount is 150 mg; slightly after the 12th hour, the amount is 300 mg.