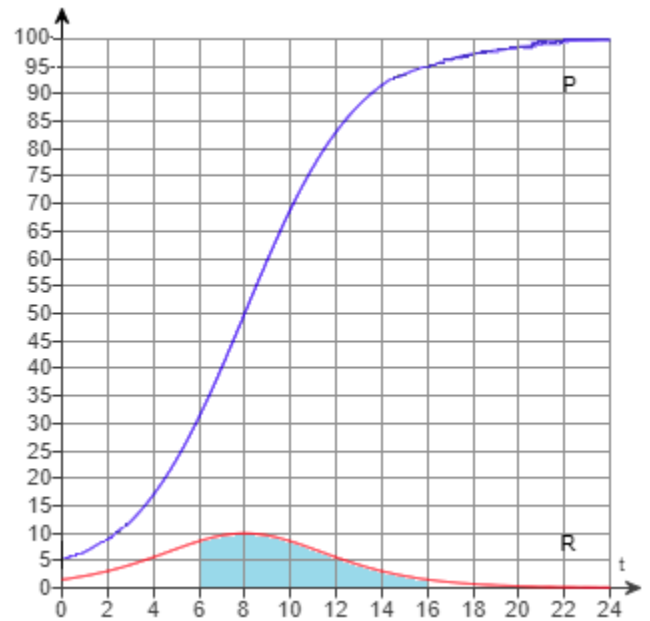
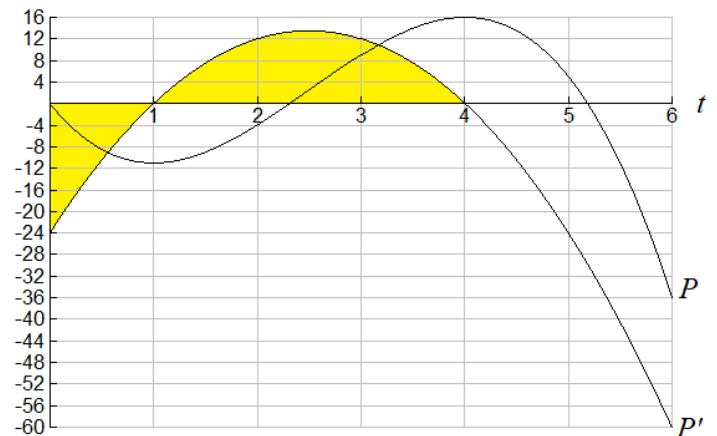


## Definite Integrals (Section 5.2) and the *Fundamental* Theorem of Calculus (Section 5.3)

- The rate  $R$  at which people are becoming infected with a contagious virus  $t$  weeks after the epidemic began is graphed to the right, along with the total number of people,  $P$ , who have been infected.
  - Find and interpret the shaded area from week 6 to week 16.
  - What is the total area under  $R$ ? Interpret.



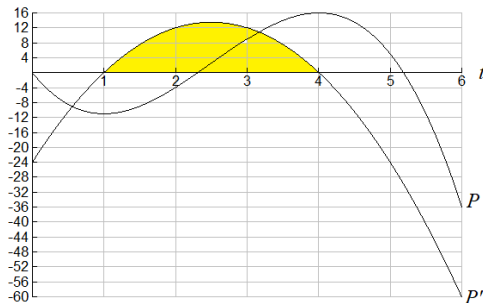
- The graph shows a company's profit,  $P$ , in thousands, and marginal profit  $P'$  in thousands per year, for a 6 year interval.
  - Report and interpret the meaning of the shaded area from  $t = 0$  to  $t = 4$ .



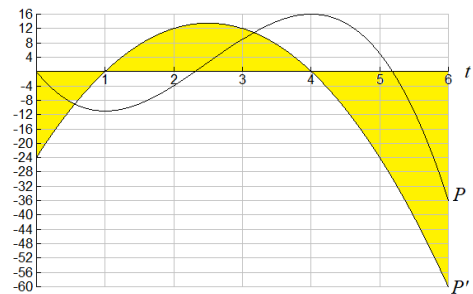
- Sketch the line which represents  $\Delta P$  for this interval.

- It is known that the shaded area under the curve  $P'$  from  $t = 0$  to  $t = 1$  is  $-11$ . Find the following areas.

- From  $t = 1$  to  $t = 4$ .



- From  $t = 0$  to  $t = 6$ .



## Riemann Sums, Summation Notation, Definite Integrals, and FTC

Important Ideas:

### Check Your Understanding!

1. Snow starts falling at 6 AM. The rate that snow is falling overnight is represented by the equation  $S'(t)$  where  $S'(t)$  is measured in inches per hour, and  $t$  represents hours since midnight. Write an integral expression that gives the total amount of snow that falls during the first 3 hours of snow fall.

2. The function  $C'(t)$  gives the rate, in bars per minute, at which chocolate bars are being removed from a shelf at the grocery store, where  $t$  is measured in minutes. Using correct units, interpret the meaning of the following expression in the context of this problem.

$$\int_0^9 C'(t) dt = 46$$

3. Paul is using rectangles to find the area under a curve on the interval  $[-2,7]$ . Use integral notation to express the following limit.

$$\lim_{n \rightarrow \infty} \sum_{i=1}^n (3x_i^2 - 5x_i) \Delta x$$

4. The figure shows the velocity of your trip starting from home. Positive velocities take you away from home and negative velocities take you toward home.

The formula of the velocity, in km/hr, is given by  $v(t) = 6t^3 - 48t^2 + 54t + 108$ , where  $t$  is in hours. The FNINT command might be helpful.

- a. How many km are you away from home at the end of the 4 hours?
- b. When are you farthest from home?
- c. How far away are you at that time?

