

Chapter 4 - Applications of the derivative 4

Related rates

What is the main difference in these problems from the once studied before?

Problems:

1. An initially empty spherical balloon is inflated at a rate of 2 cubic inches per second.

(a) Find the rate of change of the radius of the balloon when the radius reaches 5 inches.

(b) At what rate is the surface area changing at that time?

2. The average cost per item, C , in dollars, of manufacturing a quantity q of calculators is given by the following equation, where a and b are positive constants.

$$C = a/q + b$$

(a) Find the rate of change of C as q increases. What are its units?

(b) If production increases at a rate of 120 calculators per week, how fast is the average cost changing?

Is the average cost increasing or decreasing?

3. An accidental perforation in a large glue container causes a circular slick on the surface of the calculus classroom. When its radius is 5 meters, the radius of the slick is expanding by 0.6 meter/minute and its thickness is 0.06 meter.

(a) At that moment, how fast is the area of the slick expanding?

(b) The circular slick has the same thickness everywhere, and the volume of glue spilled remains fixed. How fast is the thickness of the slick decreasing?