

Exercise 94

A forest fire leaves behind an area of grass burned in an expanding circular pattern. If the radius of the circle of burning grass is increasing with time according to the formula $r(t) = 2t + 1$, express the area burned as a function of time, t (minutes).

Solution

The area of a circle is

$$A(r) = \pi r^2.$$

But the radius is $r = r(t) = 2t + 1$.

$$\begin{aligned} A(r(t)) &= \pi[r(t)]^2 \\ &= \pi(2t + 1)^2 \\ &= \pi(4t^2 + 4t + 1) \\ &= 4\pi t^2 + 4\pi t + \pi \end{aligned}$$