Sec 14 # 13 (Done incompletely in Sec 01 class today)

$f(x) = \frac{1}{5}x^2 + 3x + 12$ thousand dollars from parking meters

where x = thousand population of tourists

We're given a couple of things:

Rate: $\frac{dx}{dt} = 2$ thousand tourists per summer (it's increasing by this since $\frac{dx}{dt} > 0$)

when $x = 14$ thousand tourists.

These are initial conditions. If we want to find how fast the income from the parking is increasing at the initial conditions, we set up the scheme typical of all RR:

$$\frac{df}{dt} = \frac{df}{dx} \cdot \frac{dx}{dt}$$

This employs the chain rule on $f(x(t))$. But remember, your given fcn won't have t apparent. You have to know the wording "at what rate ... when ..." is pointing to RR. So:

$$\frac{df}{dt} = \frac{df}{dx} \cdot \frac{dx}{dt} = \left[2\left(\frac{1}{5}\right)x + 3\right]\left[\frac{dx}{dt}\right]$$

$$= \left[\frac{2}{5}x + 3\right]\left[\frac{dx}{dt}\right]$$