

Calculus 12
7-3 Questions

1. Find the rate of change of the area of a circle with respect to its radius r when $r = 5$ cm.

2. If a tank holds 1000 L of water, which takes an hour to drain from the bottom of the tank, then the volume V of water remaining in the tank after t minutes is

$V = 1000\left(1 - \frac{t}{60}\right)^2$, $0 \leq t \leq 60$. Find the rate at which the water is flowing out of the tank (the instantaneous rate of change of V with respect to t) after 10 minutes.

3. The mass of the part of a wire that lies between its left end and a point x metres to the right is \sqrt{x} kilograms.

a) Find an approximate value for the average density of the part of the wire from $x = 1$ m to $x = 1.1$ m.

b) Find the linear density when $x = 1$ m.

4. The mass of the left x centimetres of a string is $x + \frac{1}{2}x^2$ grams. Find the linear density when $x = 6$ cm.

5. The population of a bacteria colony after t hours is given by $n = 1000 + 180t + 25t^2 + 3t^3$. Find the growth rate after 3 hours.