

INTRODUCTION TO CALCULUS

MATH 1A

UNIT 19: WORKSHEET

Problem 1: While fixing up a salad, you start pouring olive oil onto a plate. The area $A(r)$ of the oil increases with $\frac{d}{dt}A(r(t)) = 2$. If the radius is $r = 4$, what is the rate of change of r ?



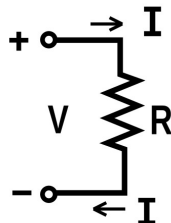
Solution:

$A(r) = r^2\pi$. We have $A' = 2rr'\pi = 2$ so $r' = 1/(r\pi) = 1/(4\pi)$.

Problem 2: The resistance R , voltage U and current I are related by Ohm's law.

$$U = RI.$$

Assume due to temperature change, the resistance $R(t)$ increases by a constant amount $R' = 2$. If the voltage stays constant $U = 4$ and $R = 1$ what is the rate of change of I ?





Solution:

For $U = RI$ we get also $I = 4$. Differentiate the law to get $0 = U' = R'I + RI'$ gives $I' = -R'I/R = -2 \cdot 4/1 = -8$.