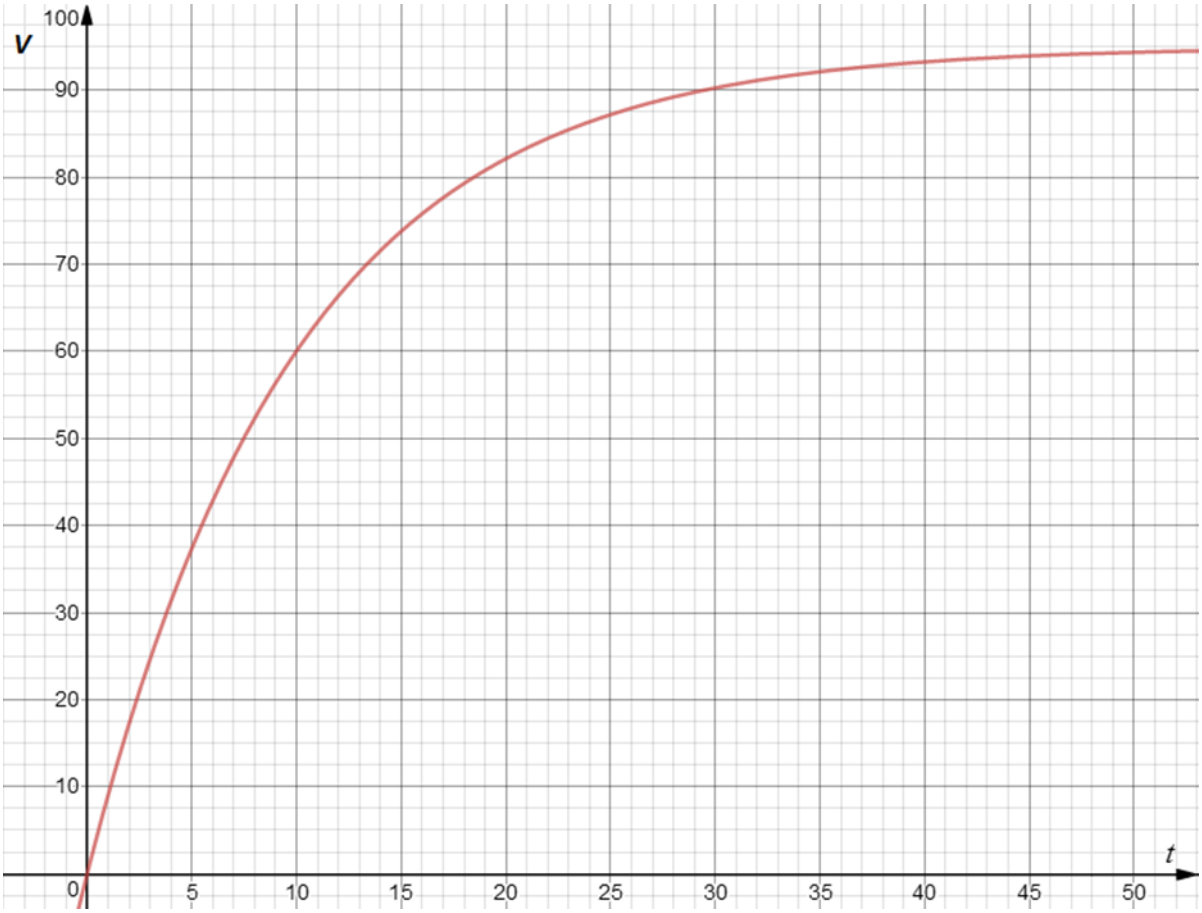
Answer on Question #64504 – Math – Calculus
Question

I was wondering when the relationship of a capacitor in voltage and time is given by $V = 95(1 - e^{-0.1t})$, how would the graph look when you plot the graph between $t = 0$ and $t = 50$ at 10 intervals.
Also Find the differentiation value at $t = 10$. To verify your solution use calculus.

Solution

t, sec	0	5	10	15	20	25	30	35	40	45	50
V, volts	0	37.38	60.05	73.82	82.14	87.21	90.27	92.13	93.26	93.95	94.36



To differentiate $V = 95(1 - e^{0.1t})$, we need to use the following rules:
1. $f'(ax) = af'(x)$;
2. $\big(f(x) \pm g(x)\big)' = f'(x) \pm g'(x)$;
3. $\Big(f\big(g(x)\big)\Big)' = f'(g(x)) \cdot g'(x)$;

Therefore,

$$V'(t) = 95 \cdot (1 - e^{-0.1t})' = 95 \cdot (1' - (e^{-0.1t})') = -95e^{-0.1t} \cdot (-0.1) = 9.5e^{-0.1t}.$$

Thus, at $t = 10$

$$V'(10) = 9.5e^{-0.1 \cdot 10} = 9.5e^{-1} = 3.495.$$

Answer provided by www.AssignmentExpert.com