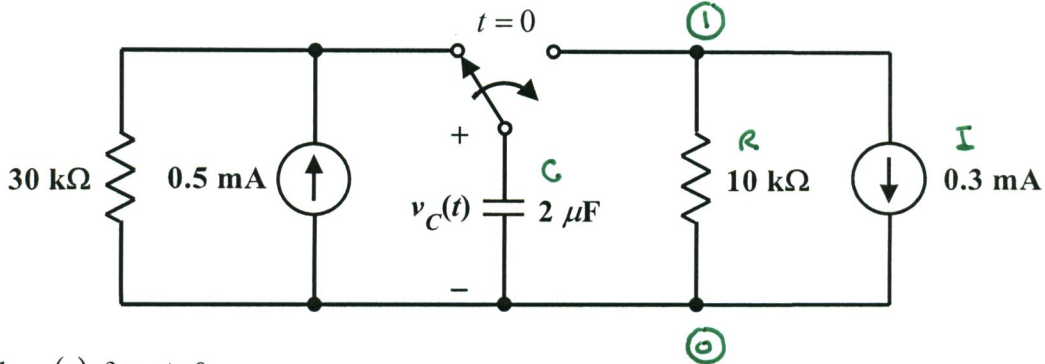


EE 2240
Problem #09

The switch has been in the position shown for a *very* long time.



a. Find $v_C(t)$ for $t \geq 0$.

$$\begin{aligned}
 v_C(0) &= (30 \text{ k}\Omega)(0.5 \text{ mA}) = 15 \text{ V} \\
 \tau &= (10 \text{ k}\Omega)(2 \mu\text{F}) = 20 \text{ ms} \\
 v_C(\infty) &= -(10 \text{ k}\Omega)(0.3 \text{ mA}) = -3 \text{ V} \\
 v_C(t) &= [v_C(0) - v_C(\infty)] e^{-t/\tau} + v_C(\infty) \\
 &= [15 - (-3)] e^{-t/0.02} + (-3) \\
 &= (18 e^{-50t} - 3) \text{ V}, t \geq 0
 \end{aligned}$$

b. Use PSpice and PROBE to plot the power delivered by the 0.3 mA independent current source for $0 \leq t \leq 100 \text{ ms}$.

Problem #09

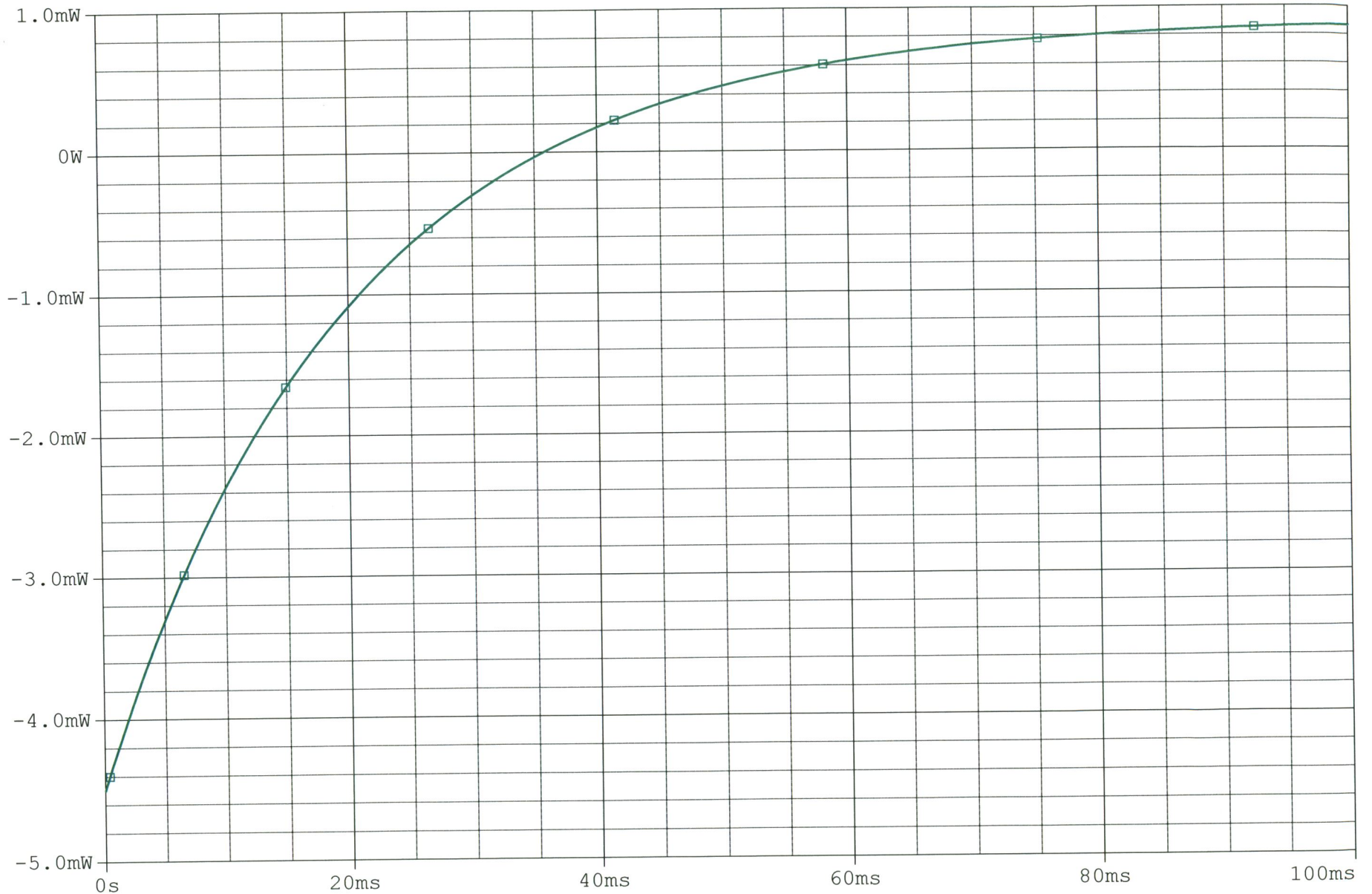
```

C 1 0 2u IC=15
R 1 0 10k
I 1 0 DC 0.3m
.TRAN 1m 100m 0 1m USC
.PROBE
.END
    
```

↑
5τ = 100ms

See the next page for the output.

Problem #09
(A) 09.dat (active)



□ - $W(I)$ ↪ energy absorbed is $W(I)$,
energy delivered is $-W(I)$

Time