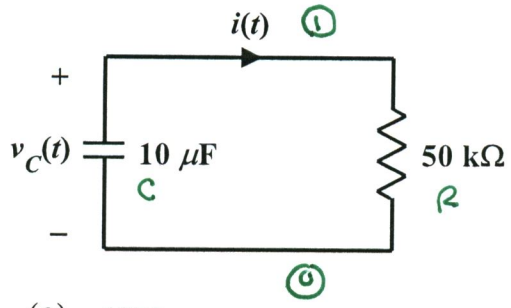
EE 2240

Problem #11

Given the *RC* circuit shown below:



a. Find $v_C(t)$ for $t \geq 0$, if $v_C(0) = 40\,\text{V}$.

$\tau = (50k\Omega)(10\mu F) = 0.5\,s$

$v_c(t) = v_c(0)\, e^{-t/\tau}$

$= 40\, e^{-2t}$ V, $t \geq 0$

b. Find $i(t)$ for $t \geq 0$.

$i(t) = \frac{1}{50k\Omega}\, v_c(t)$

$= 0.8\, e^{-2t}$ mA, $t \geq 0$

c. Use PSpice and PROBE to plot the power absorbed by the resistor, $p(t) = v_C(t) \times i(t)$, over a time span equal to $5 \times \tau$ where τ is the time constant of the *RC* circuit.

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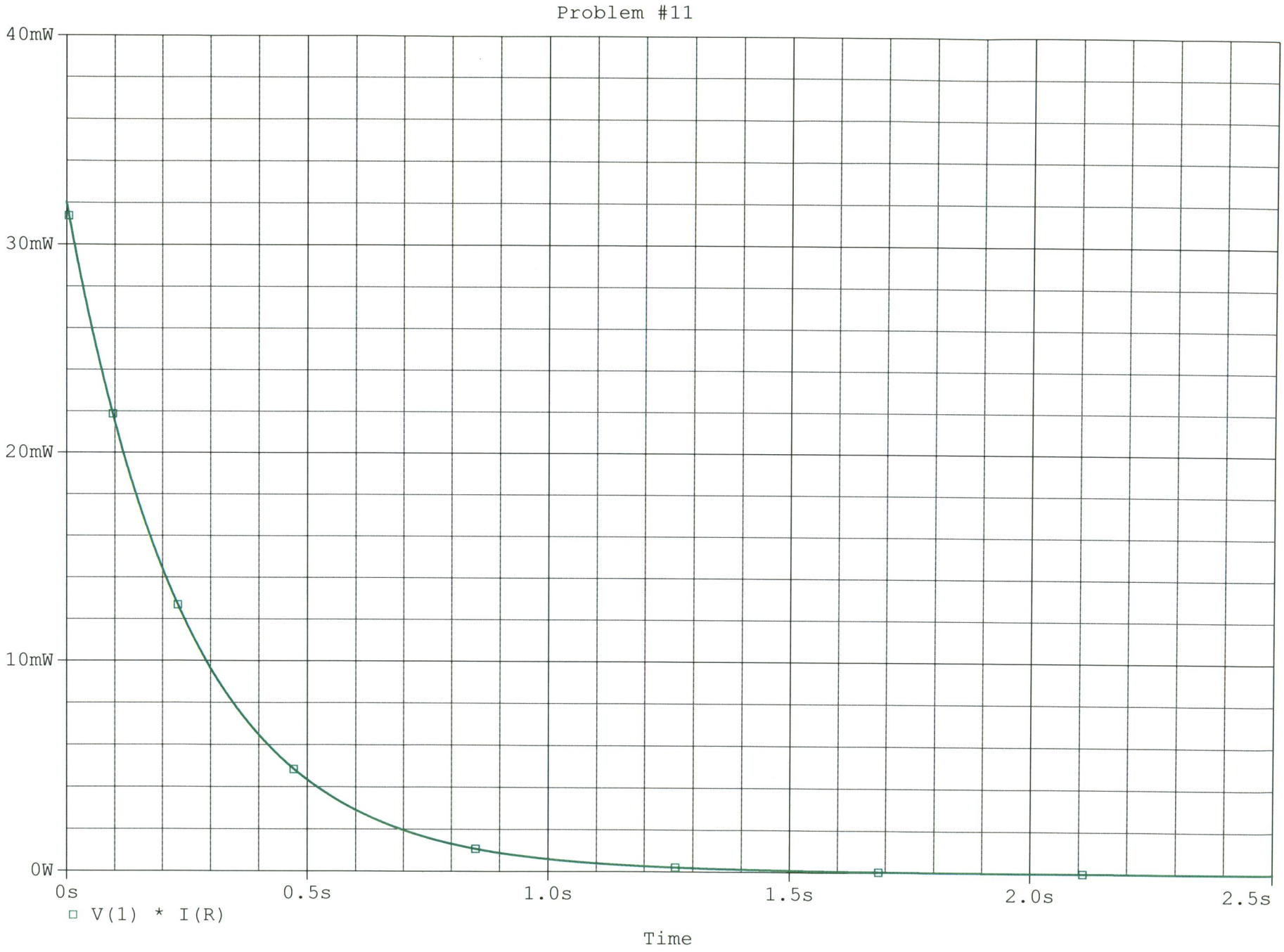
Problem #11
C  1  0  10u  IC = 40
R  1  0  50k
.TRAN  1m  2.5  0  1m  UIC
.PROBE          ↑ 5τ = 2.5 s
.END
```

See the next page for the output.


Problem #11
40mW
30mW
20mW
10mW
0W
0s
0.5s
1.0s
1.5s
2.0s
2.5s
V(1) * I(R)
Time