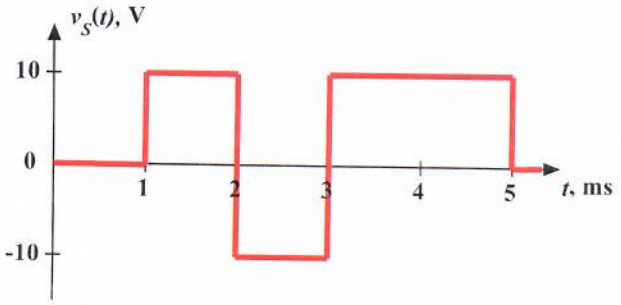
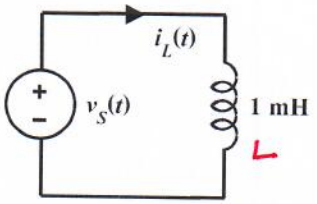
EE/EET 2240

Homework Problem #043





$v_L(t) = v_S(t)$

The independent voltage source is described by the plot shown. Given $i_L(0) = 0\,\text{A}$, accurately sketch the waveform for the current $i_L(t)$ for $0 < t$.

$$i_L(t) = i_L(0) + \frac{1}{L}\int_0^t v(\tau)\,d\tau = 1000\int_0^t v(\tau)\,d\tau$$

$0 < t < 1\text{ms}$: $v_L(t) = 0 \Rightarrow i_L(t) = 1000\int_0^t 0\,d\tau = 0$

$1\text{ms} < t < 2\text{ms}$:

$$i_L(t) = 0 + 1000\int_{0.001}^t 10\,d\tau = 10000(t - 0.001)$$

$$= 0 + 10000t - 10 \quad \text{A}$$

$2\text{ms} < t < 3\text{ms}$:

$$i_L(t) = 0 + 1000\int_{0.001}^{0.002} 10\,d\tau + 1000\int_{.002}^t (-10)\,d\tau$$

$$= 0 + 10 - 10000(t - 0.002)$$

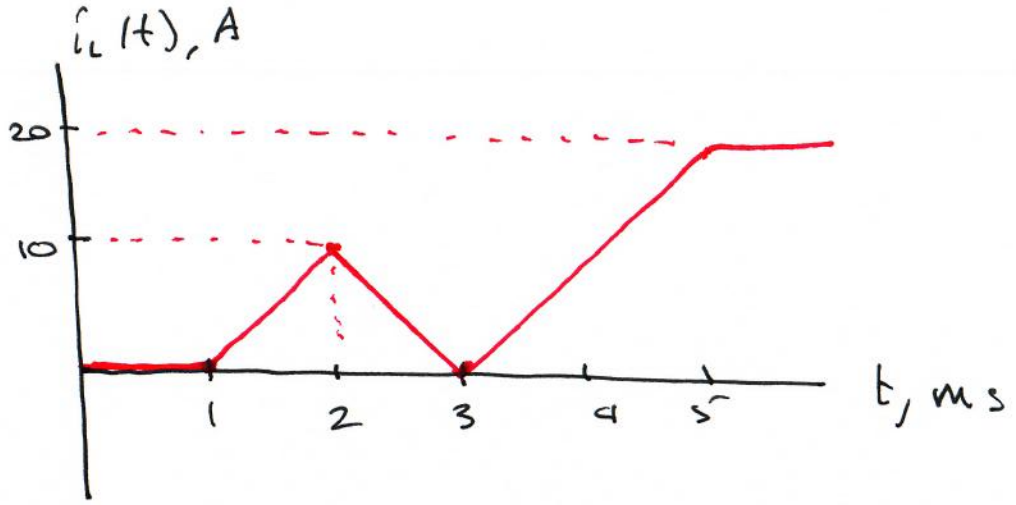
$$= 30 - 10000t$$

$3\text{ms} < t < 5\text{ms}$

$$i_L(t) = 30 - 30 + 1000\int_{.003}^t 10\,d\tau$$

$$= 0 + 10000(t - 0.003)$$

$$= 10000t - 30$$


$i_L(t)$, A
20
10
1
2
3
4
5
t, ms

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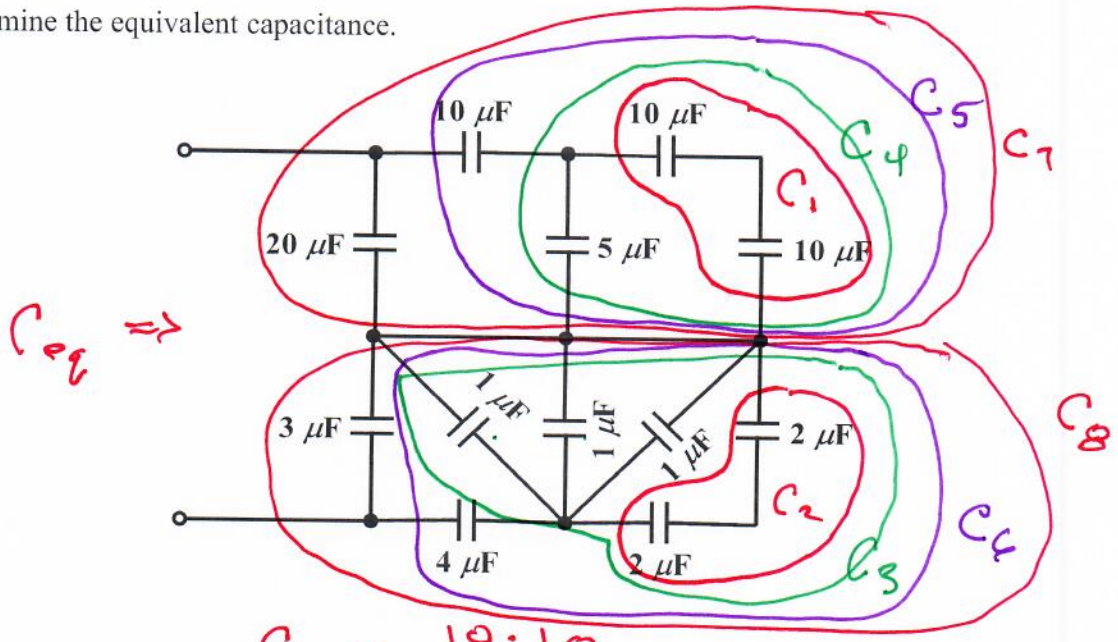
Homework Problem #044

Determine the equivalent capacitance.



$C_1 = \frac{10 \cdot 10}{10+10} = 5\,\mu F$

$C_2 = \frac{2 \cdot 2}{2+2} = 1\,\mu F$

$C_3 = 1 + 1 + 1 + C_2 = 4\,\mu F$

$C_4 = 5\,\mu F + C_3 = 10\,\mu F$

$C_5 = \frac{10 \cdot C_4}{10 + C_4} = 5\,\mu F$

$C_6 = \frac{4 \cdot 4}{4+4} = 2\,\mu F$

$C_7 = 20 + C_5 = 25\,\mu F$

$C_8 = 3 + C_6 = 5\,\mu F$

$C_{eq} = \frac{C_7 \cdot C_8}{C_7 + C_8} = \frac{125}{30}\,\mu F = \frac{25}{6}\,\mu F$

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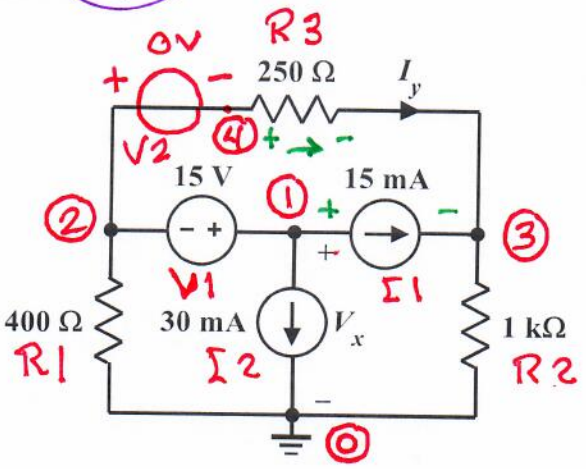
Homework Problem #047

Use PSpice to determine V_x and I_y.



Submit a complete printed copy of your output file, and highlight the answers in some obvious manner. (Don't forget to put a personal identifier in the title line of your input circuit description file – also called the netlist).

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Homework Problem #047 - RES
V2    2    4    DC    0
R3    4    3    250
V1    1    2    DC    15
I1    1    3    DC    15m
R1    2    0    400
I2    1    0    DC    30m
R2    3    0    1k
.END
```

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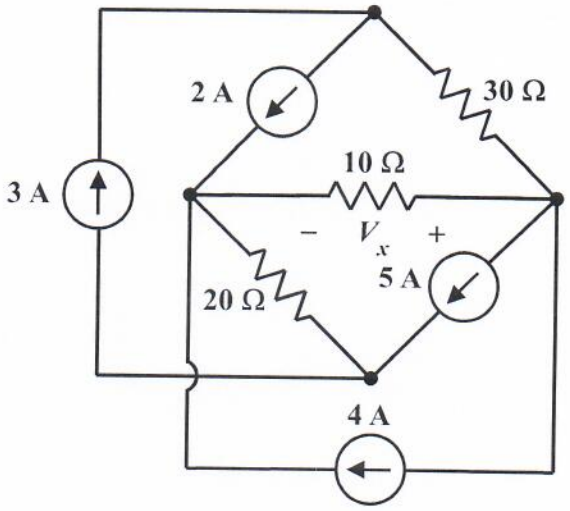
Homework Problem #046



Use PSpice to determine the value of V_x. Submit a complete printed copy of your output file, and highlight the answer in some obvious manner. (Don't forget to put a personal identifier in the title line of your input circuit description file – also called the netlist).

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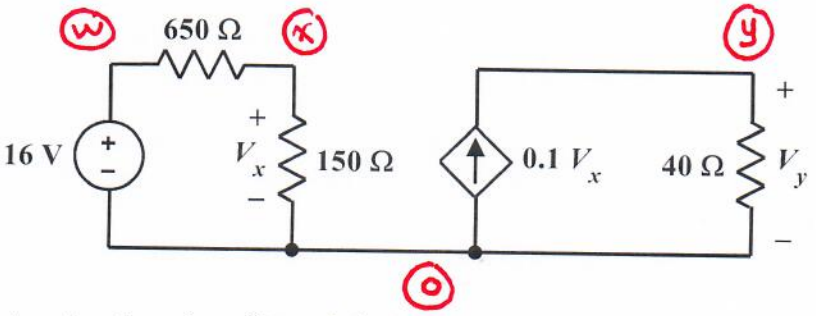
Homework Problem #048



Use PSpice to determine the value of V_y. Submit a complete printed copy of your output file, and highlight the answer in some obvious manner. (Don't forget to put a personal identifier in the title line of your input circuit description file – also called the netlist).

VCCS:

G O y x O 0.1

for Vx

source coeff.

name + node − node

+node −node

assuming PSC