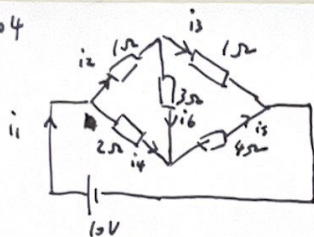


HW1 601.604
 Probl
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I:

$$i_1 = i_2 + i_4 = i_3 + i_5$$

$$i_2 = i_3 + i_6$$

$$i_5 = i_4 + i_6$$

$$\Rightarrow i_6 = i_2 - i_3 = i_2 - 10 + i_2 = 2i_2 - 10$$

V:

$$2i_4 = i_2 + 3i_6$$

$$i_3 = 3i_6 + 4i_5$$

$$0 = 10 \times 2 + (i_2 + i_3 - 10) \times 2 \Rightarrow i_3 = 10 - i_2$$

Validation:

$$i_2 + i_4 = \frac{140}{29} + \frac{55}{29} = \frac{195}{29} = i_1$$

$$i_3 + i_5 = \frac{150}{29} + \frac{45}{29} = \frac{195}{29} = i_1$$

$$i_2 + i_6 = \frac{150}{29} + (-\frac{10}{29}) = \frac{140}{29} = i_2$$

$$i_4 + i_6 = i_5 \quad \checkmark$$

$$i_2 + 3i_6 = \frac{140}{29} + (-\frac{30}{29}) = \frac{110}{29} = 2i_4$$

$$3i_6 + 4i_5 = -\frac{30}{29} + \frac{160}{29} = \frac{130}{29} = i_3$$

$$i_2 + i_3 = \frac{290}{29} = 10$$

$$10 - i_2 = 3(2i_2 - 10) + 4i_5$$

$$10 - i_2 = 6i_2 - 30 + 4i_5$$

$$40 - 4i_5 = 7i_2$$

$$i_5 = \frac{40 - 7i_2}{4} = 10 - \frac{7}{4}i_2$$

$$2i_4 = i_2 + 3(2i_2 - 10) = 7i_2 - 30$$

$$i_4 = \frac{7}{2}i_2 - 15$$

$$10 - \frac{7}{4}i_2 = \frac{7}{2}i_2 - 15 + 2i_2 - 10$$

$$10 = (\frac{21}{4} + 2)i_2 - 25$$

$$35 = \frac{29}{4}i_2$$

$$i_2 = \frac{140}{29}$$

$$i_3 = 10 - \frac{140}{29} = \frac{150}{29}$$

$$i_4 = \frac{7}{2} \cdot \frac{140}{29} - 15 = \frac{490}{29} - 15 = \frac{55}{29}$$

$$i_5 = 10 - \frac{7}{4}i_2 = 10 - \frac{7}{4} \cdot \frac{140}{29} = \frac{290 - 245}{29} = \frac{45}{29}$$

$$i_6 = i_5 - i_4 = -\frac{10}{29}$$

Therefore,

$$i_1 = \frac{195}{29} \text{ A}$$

$$i_2 = \frac{140}{29} \text{ A}$$

$$i_3 = \frac{150}{29} \text{ A}$$

Prob 2.

$$\frac{d^2 x}{dt^2} - 3 \frac{dx}{dt} + 2x = 0$$

$$t=0: \frac{dx}{dt} = 0$$

$$x = 2$$



~~$$L(x'') - 3L(x') + 2L(x) = 0$$~~

$$L(x'') - 3L(x') + 2L(x) = 0$$

$$s^2 X(s) - s x(0) - x'(0) - 3(sX(s) - x(0)) + 2X(s) = 0$$

$$s^2 X(s) - 2s - 0 - 3sX(s) + 6 + 2X(s) = 0$$

$$s^2 X(s) - 3sX(s) + 6 - 2s = 0$$

$$(s^2 - 3s)X(s) + 6 - 2s = 0$$

$$X(s) = \frac{2s - 6}{s^2 - 3s} = \frac{2s - 6}{s(s - 3)} = \frac{A}{s} + \frac{B}{s - 3}$$

$$A(s - 3) + Bs = 2s - 6$$

$$(A + B)s - 3A = 2s - 6$$

$$\begin{cases} A + B = 2 \\ A = 6 \end{cases} \Rightarrow \begin{cases} A = 6 \\ B = -4 \end{cases}$$

$$\therefore X(s) = \frac{6}{s} - \frac{4}{s - 3}$$

$$\therefore x(t) = 6 - 4e^{3t}$$