

50. Applying the loop theorem

$$\mathcal{E} - L \left(\frac{di}{dt} \right) = iR \quad ,$$

we solve for the (time-dependent) emf, with SI units understood:

$$\begin{aligned} \mathcal{E} &= L \frac{di}{dt} + iR = L \frac{d}{dt}(3.0 + 5.0t) + (3.0 + 5.0t)R \\ &= (6.0)(5.0) + (3.0 + 5.0t)(4.0) \\ &= (42 + 20t) \end{aligned}$$

in volts if t is in seconds.