

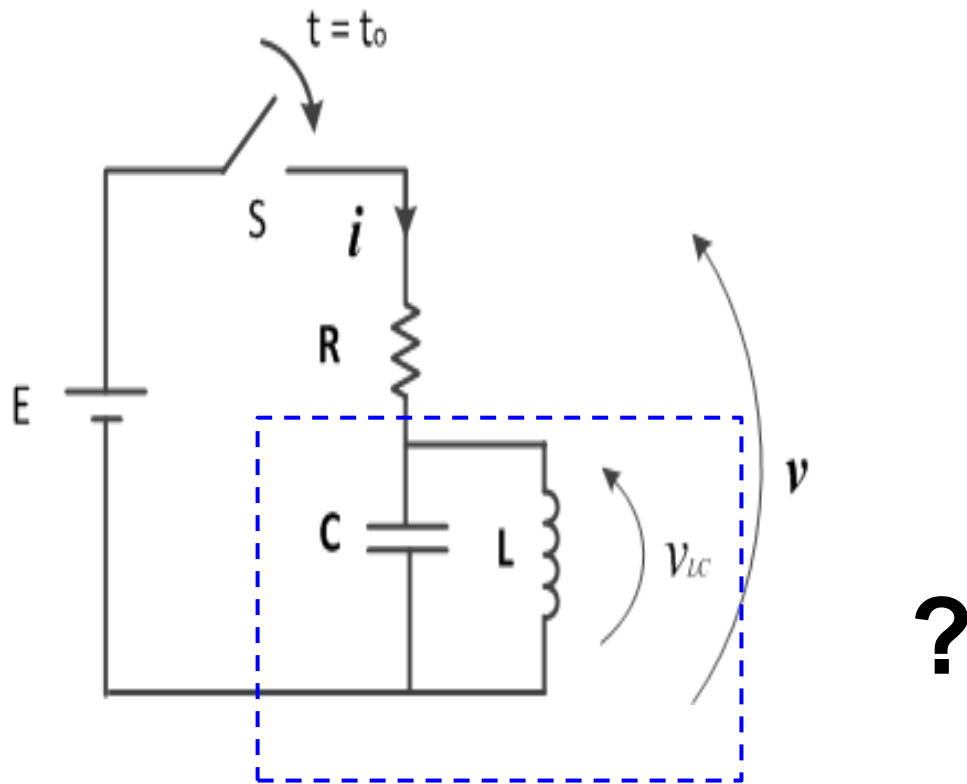
Entendendo o comportamento do circuito RLC no transitório passo-a-passo



Prof. Leopoldo Yoshioka

- O objetivo desta apresentação é “mostrar” como se comporta o circuito RLC no **transitório**.
- Transitório refere-se ao intervalo de tempo em que o **circuito ainda não se estabilizou** após receber uma certa quantidade de energia.
- Vamos ver como isso ocorre.

- Considere um circuito RLC como mostrado a seguir:



- O que será que vai ocorrer se fecharmos a chave S nesse circuito ?

- Parece complicado, não acham ?
- Vamos então ver o que vai acontecer passo-a-passo.
- Primeiro precisamos saber o que queremos descobrir.

- Veja que quando a chave S fecha a tensão total v se comporta como mostrado na figura 1.
- Queremos descobrir como se comporta a tensão sobre o capacitor e indutor V_{LC} (figura 2).

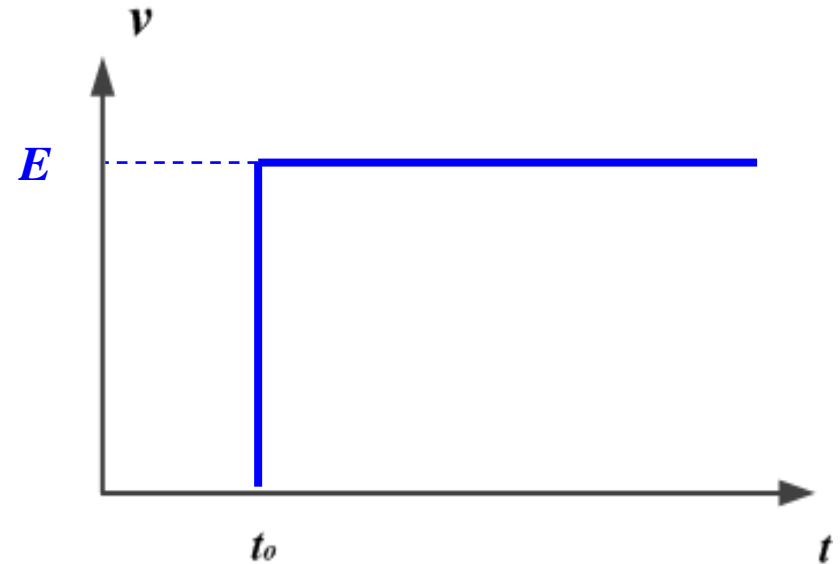


figura 1

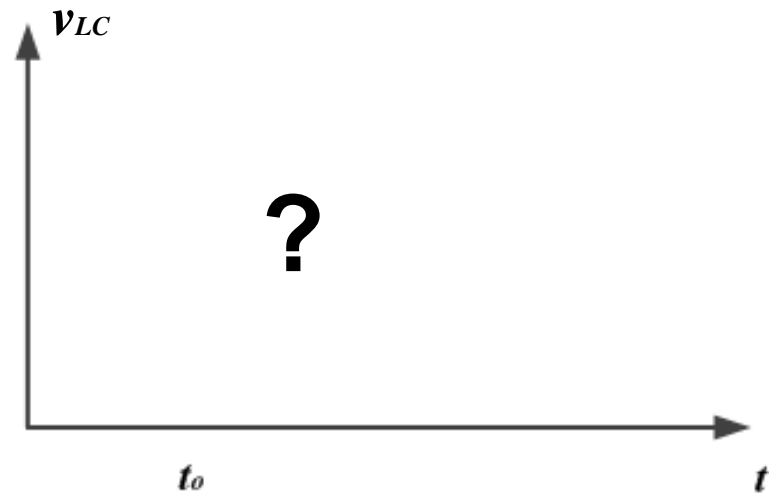
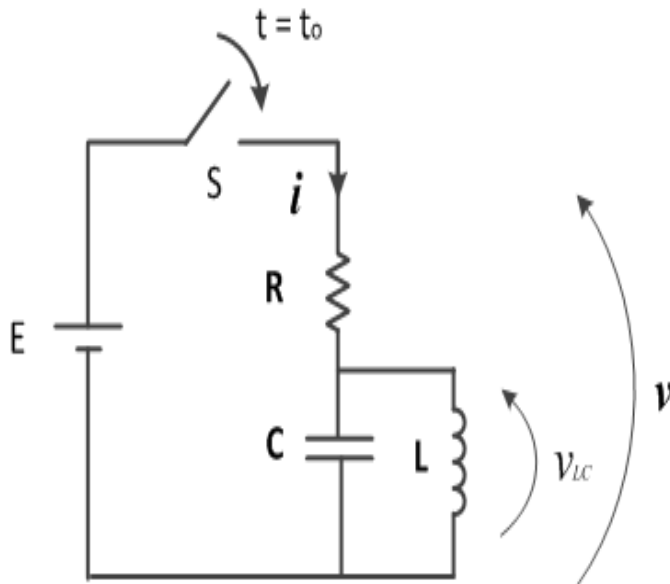
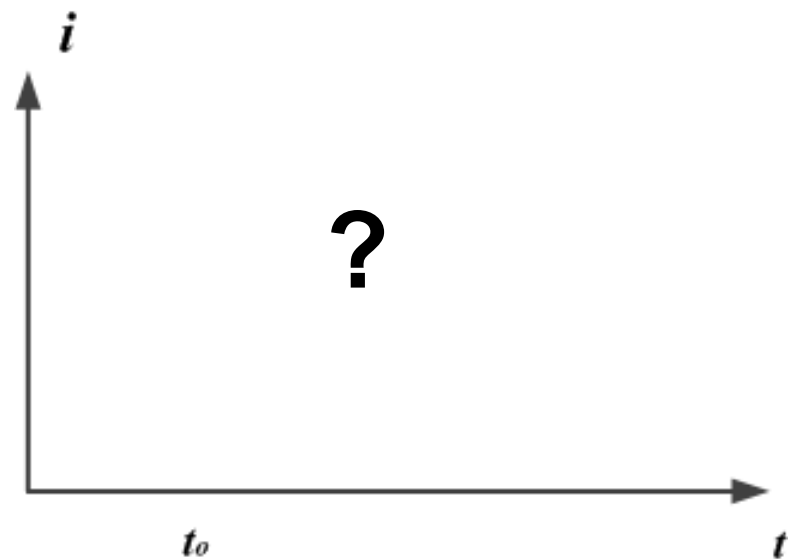
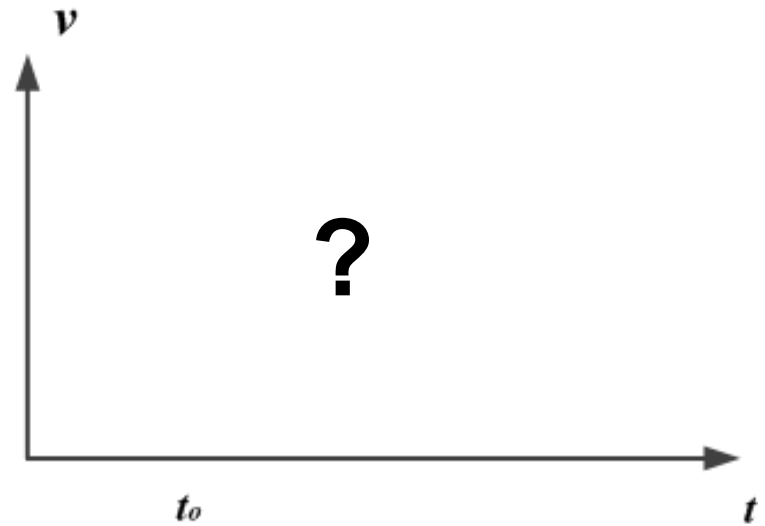
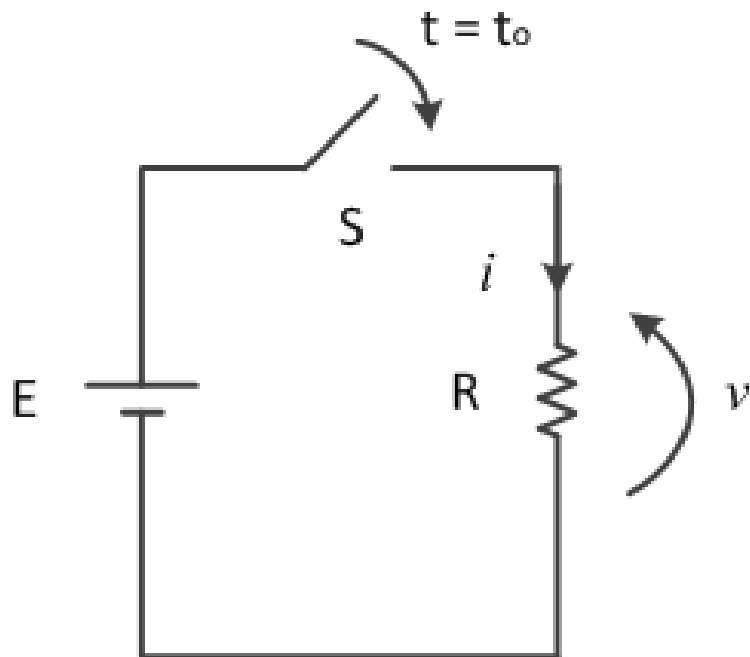
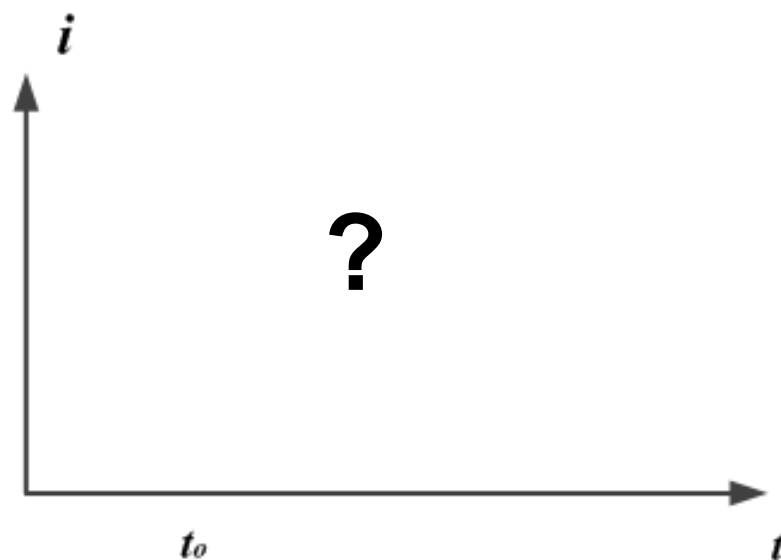
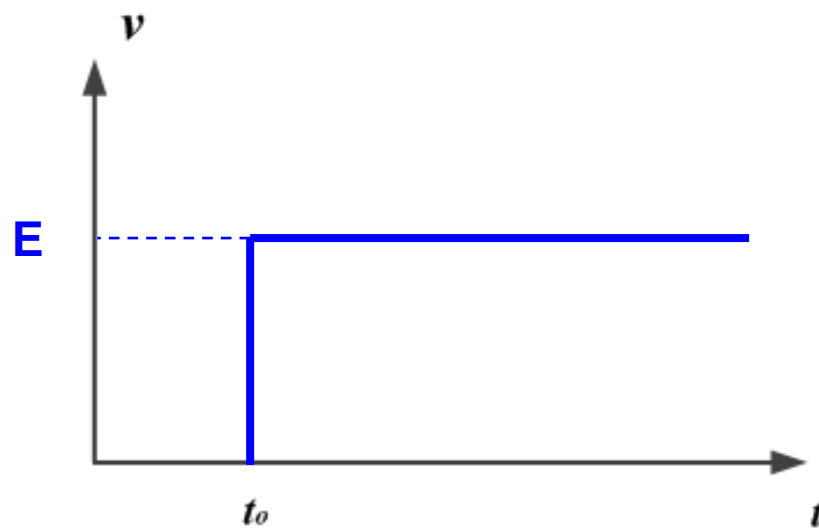
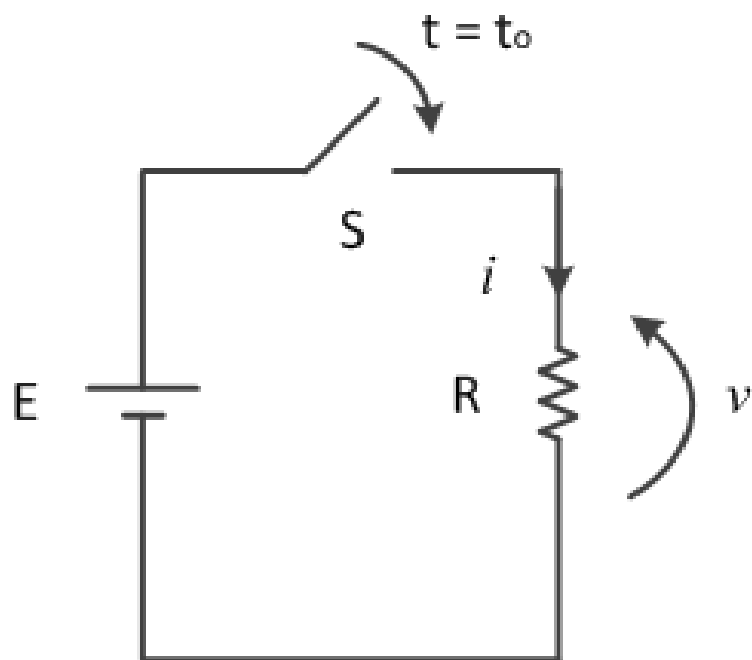


figura 2

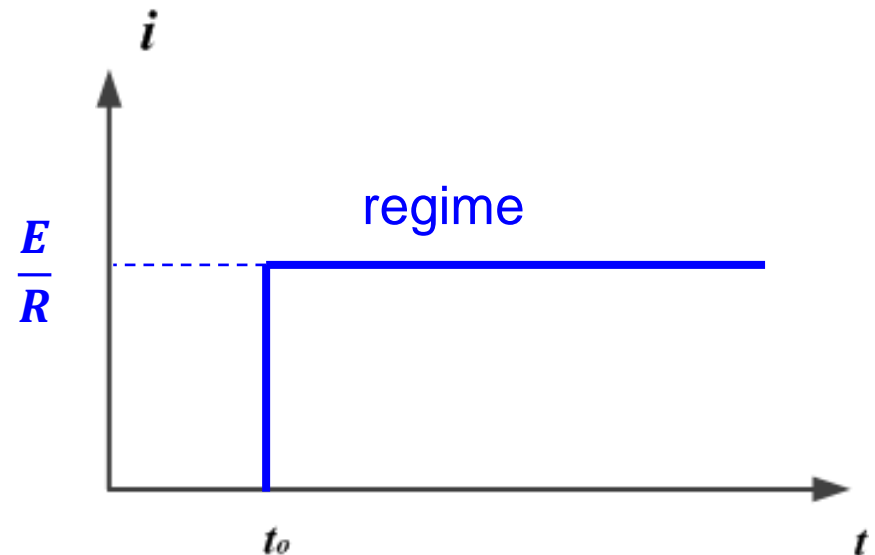
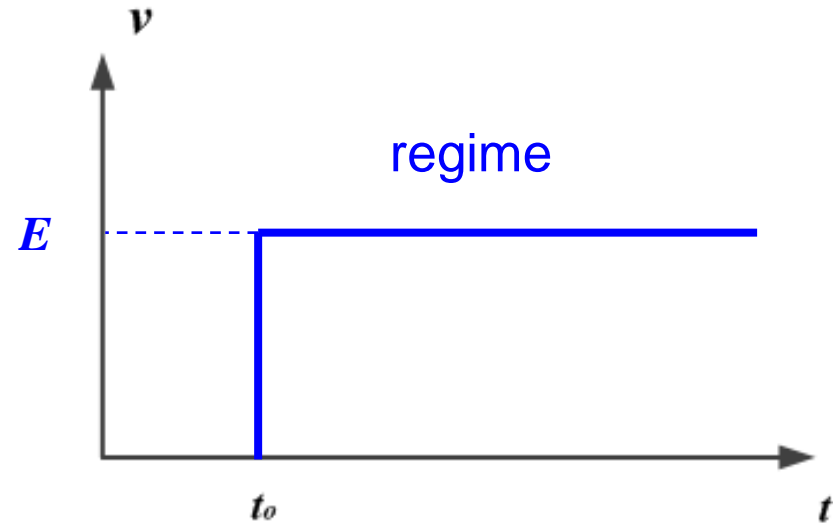
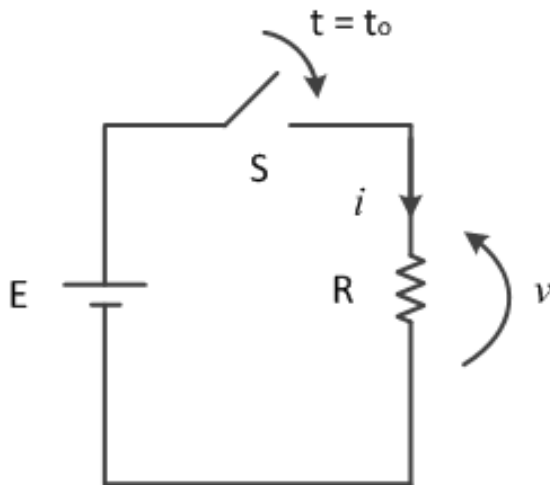
- Vamos simplificar o problema eliminando o capacitor e o indutor.
- Agora ficou fácil.



- A tensão muda instantaneamente para E .
- E a corrente ?

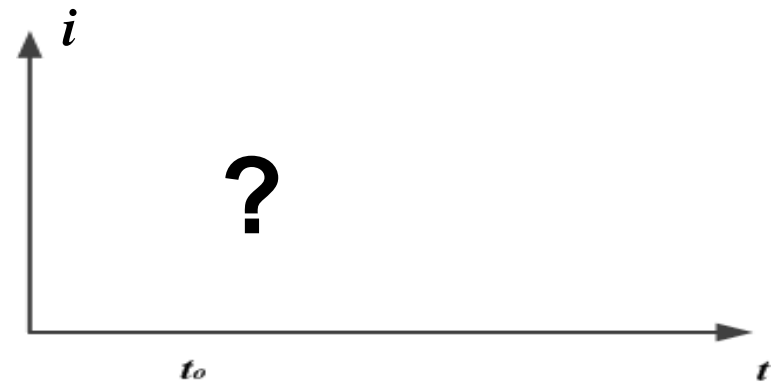
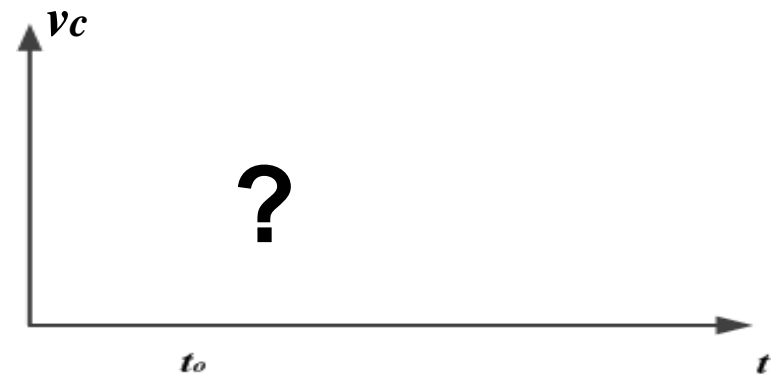
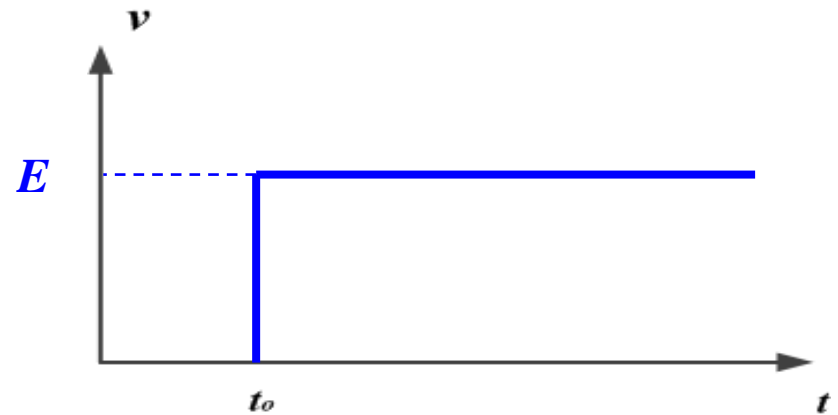
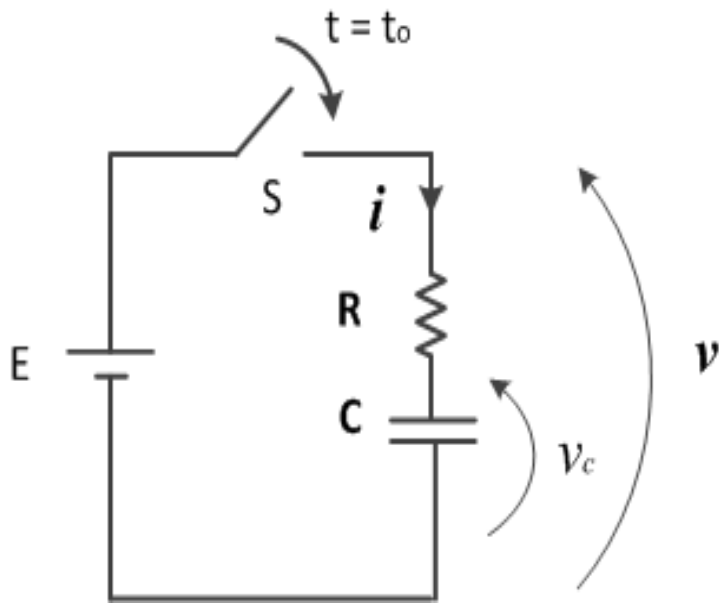


- A corrente também muda instantaneamente para **E/R !!**
- Ou seja não há transitório. Vai direto para regime.

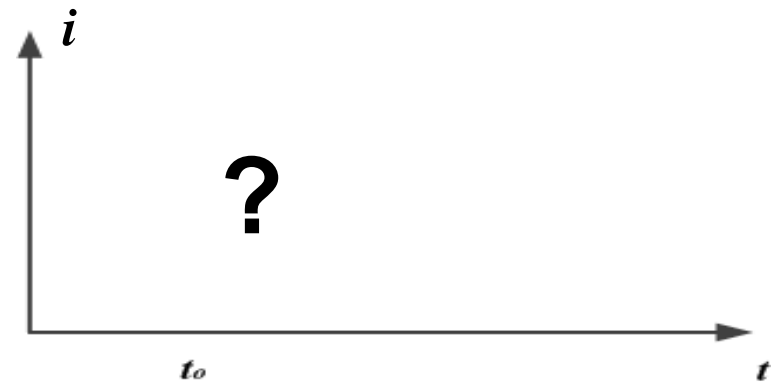
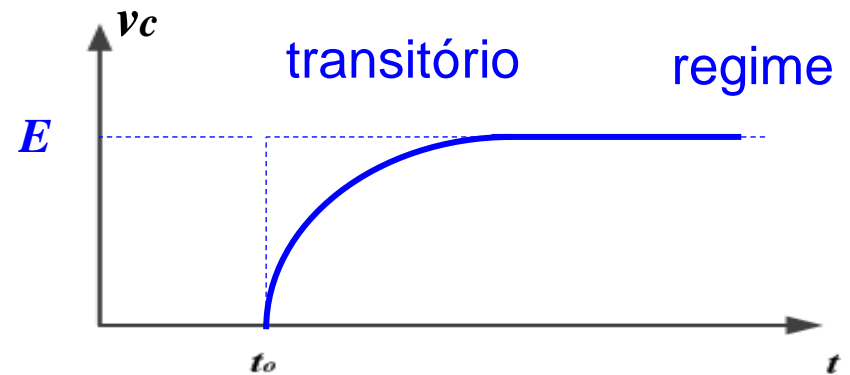
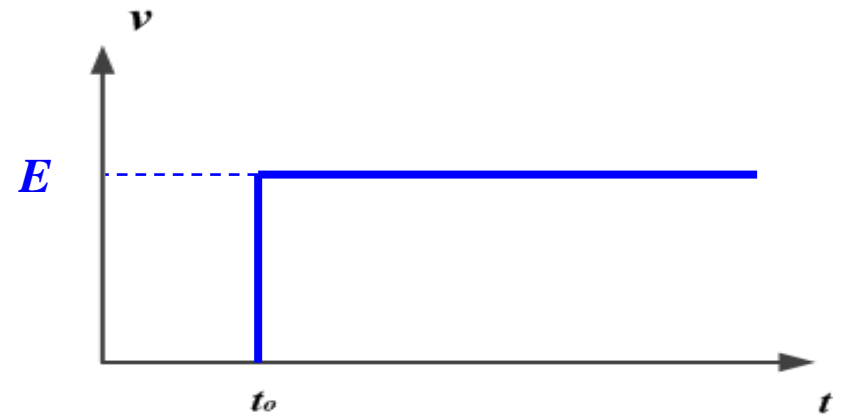
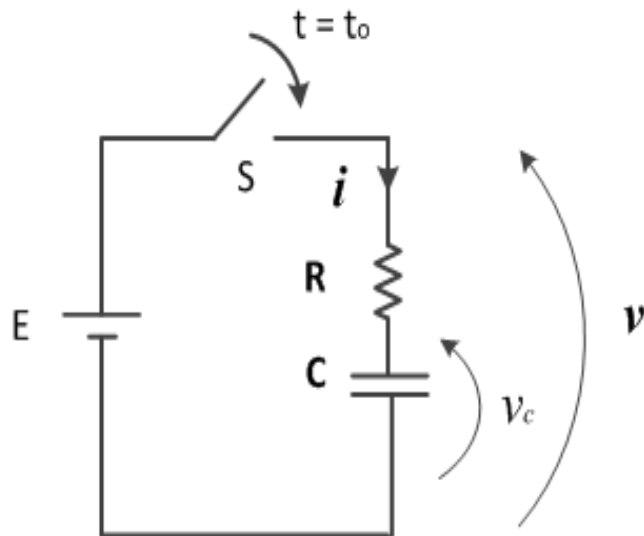


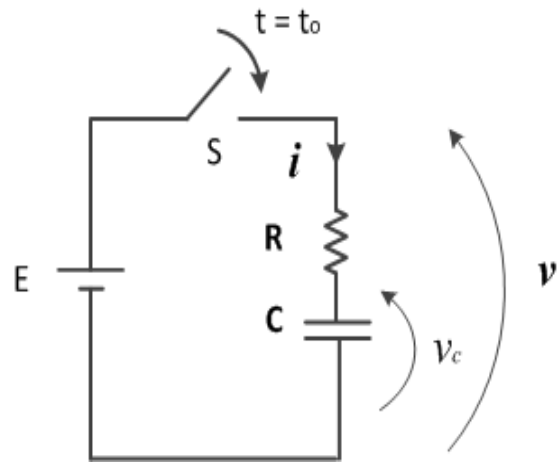
CONCLUSÃO: NO CIRCUITO RESISTIVO OCORRE A ESTABILIZAÇÃO INSTANTANEAMENTE, SEM O TRANSITÓRIO.

- Vamos acrescentar o capacitor no circuito anterior.
- Temos agora um circuito RC
- O que vai acontecer com a tensão e corrente sobre o capacitor?

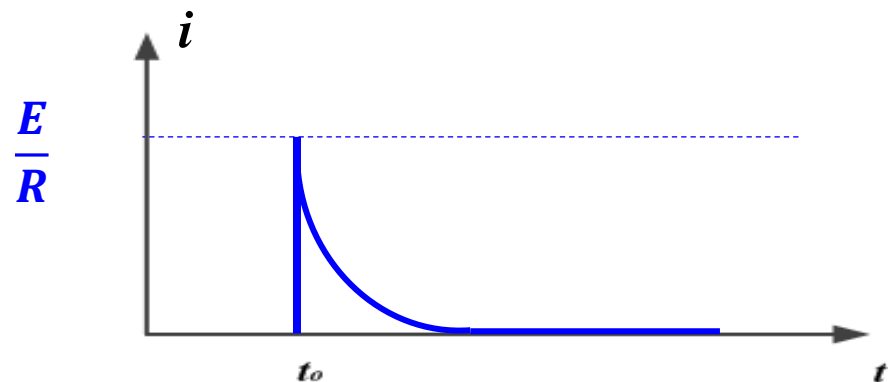
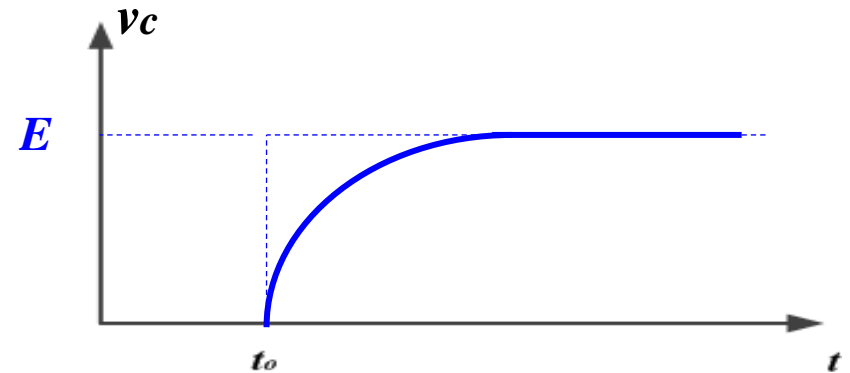
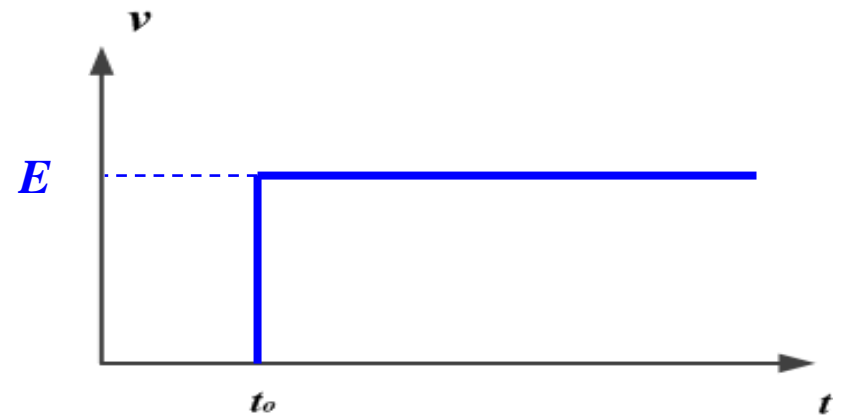


- Vejam que a tensão no capacitor, inicialmente nula, vai aumentando até atingir E .
- Quanto maior o valor de R e de C , mais tempo será necessário para estabilizar.
- E a corrente ?

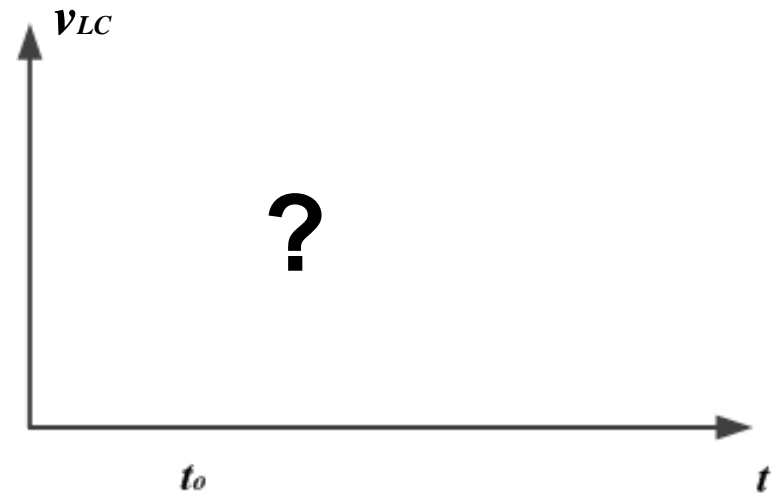
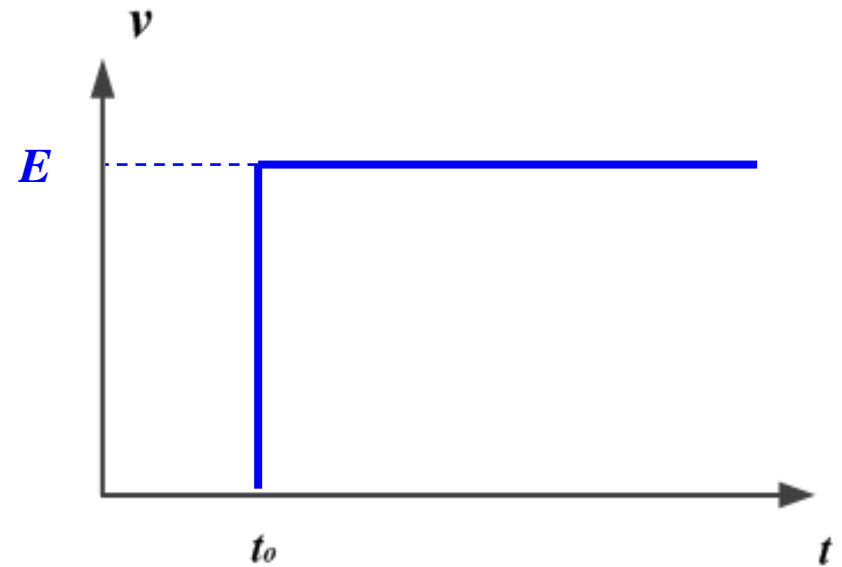
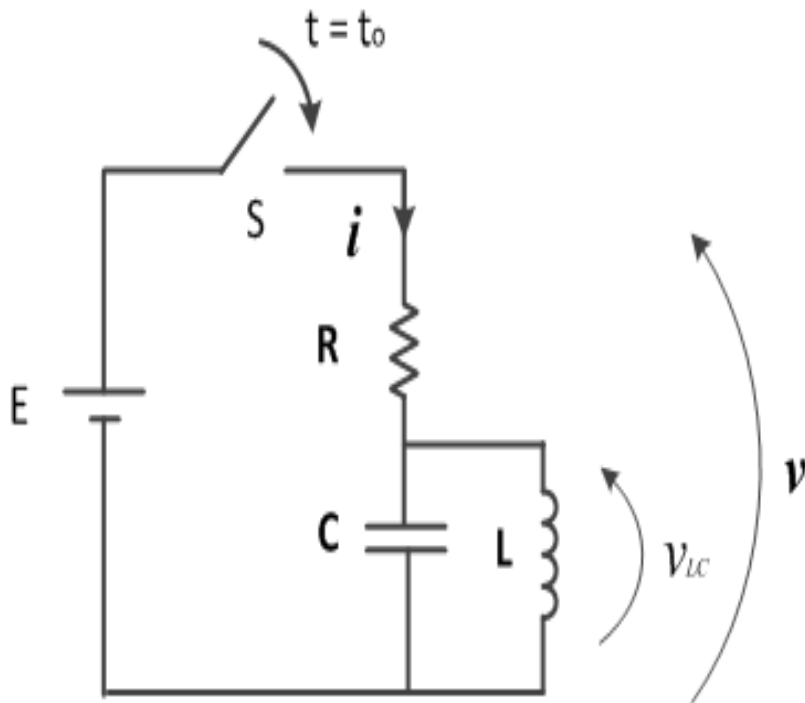




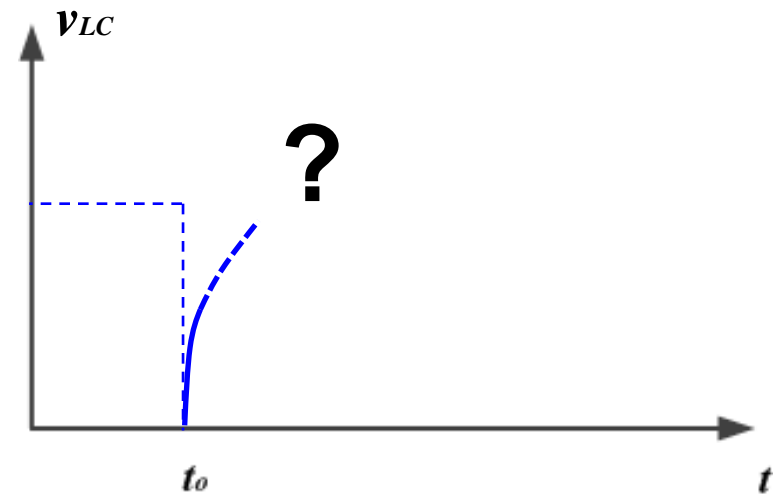
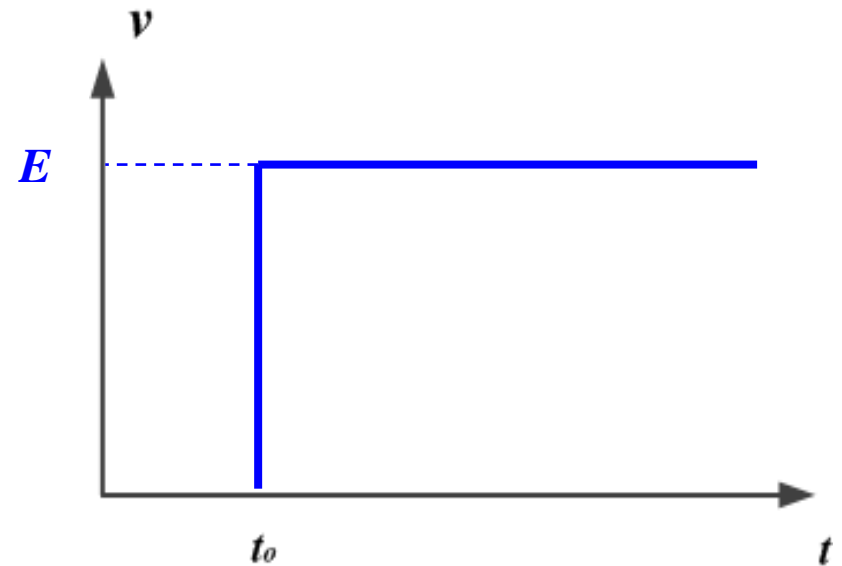
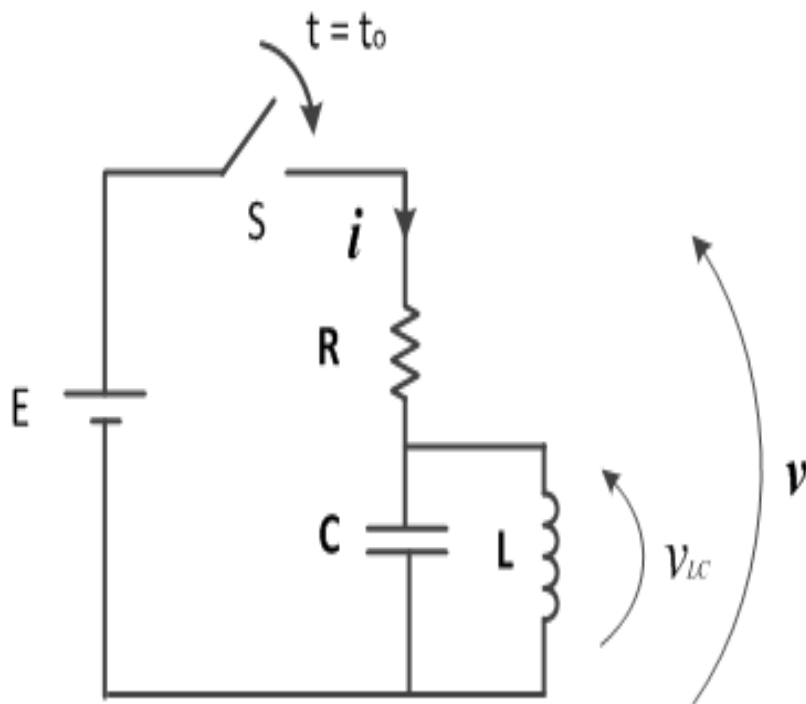
- A corrente atingiu o máximo instantaneamente.
- No início a tensão sobre o capacitor era nula. Logo a corrente se torna máxima.
- A tensão aumenta e a corrente diminui.
- Observem que $V_c + Ri = E$



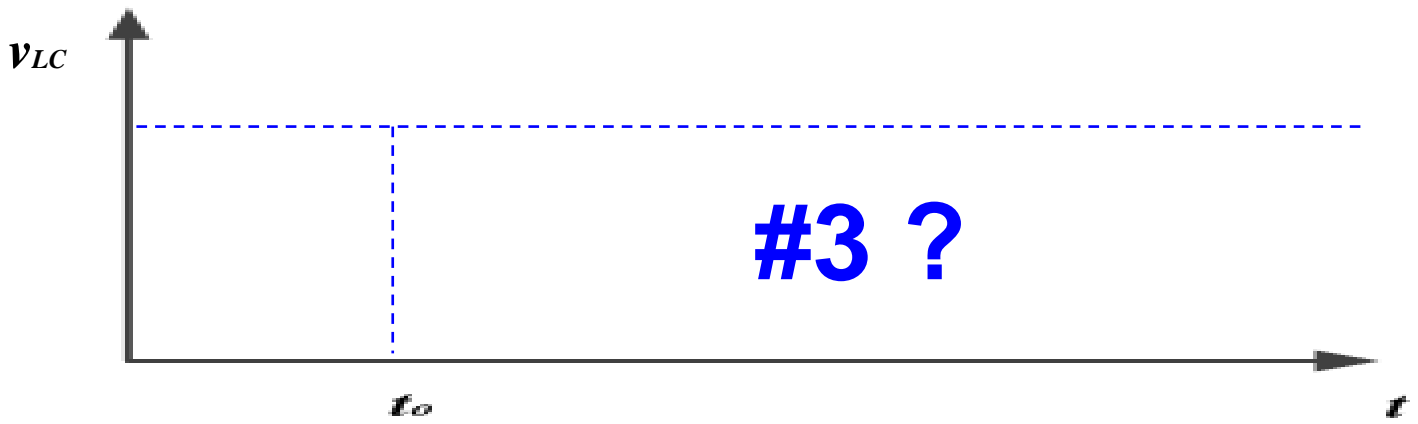
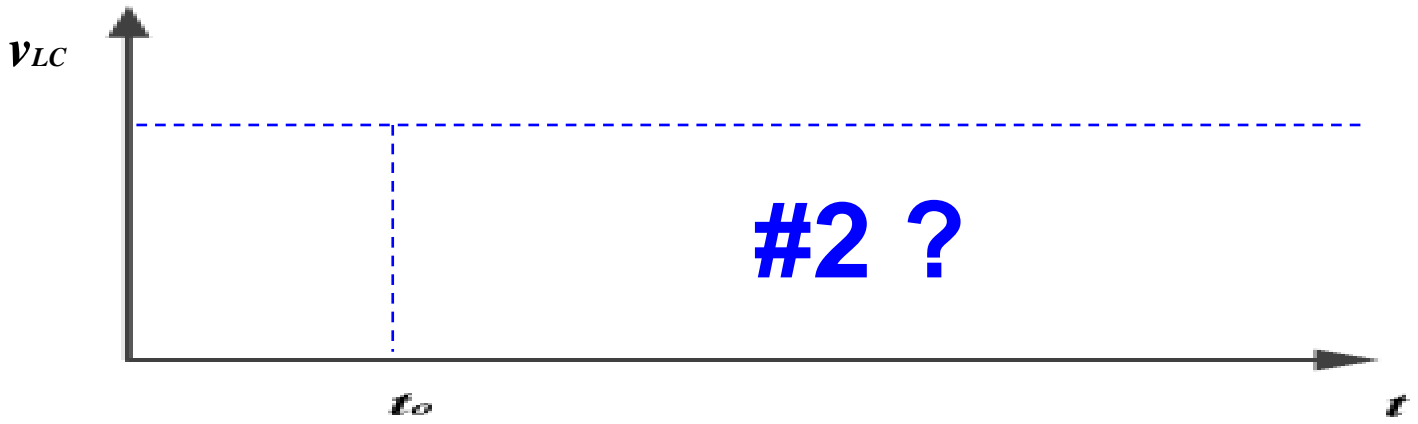
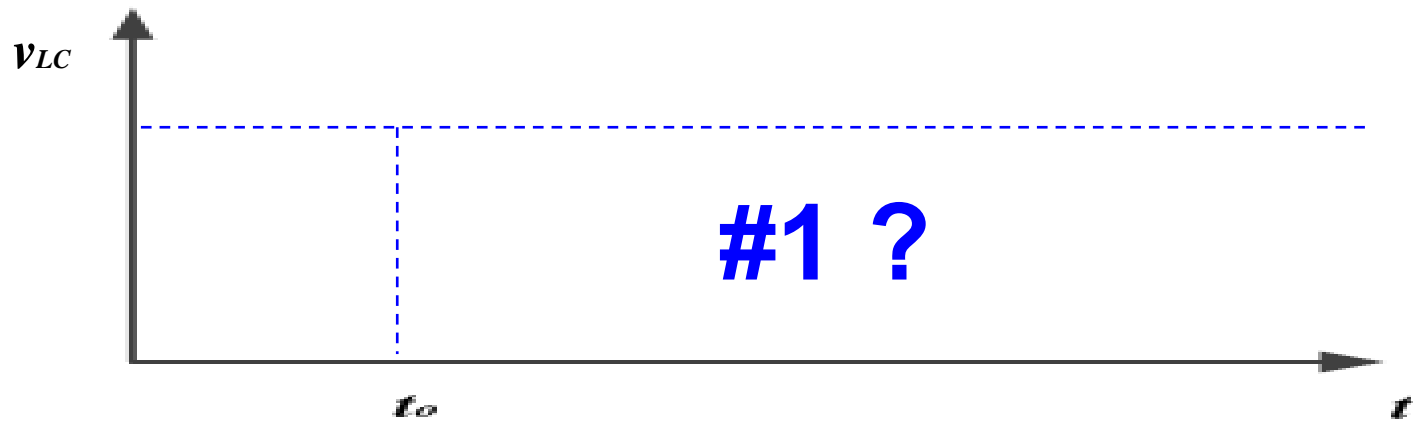
- **Acrescentando o Indutor em paralelo com o Capacitor**
- **Votamos ao problema inicial.**
- **E agora ?**

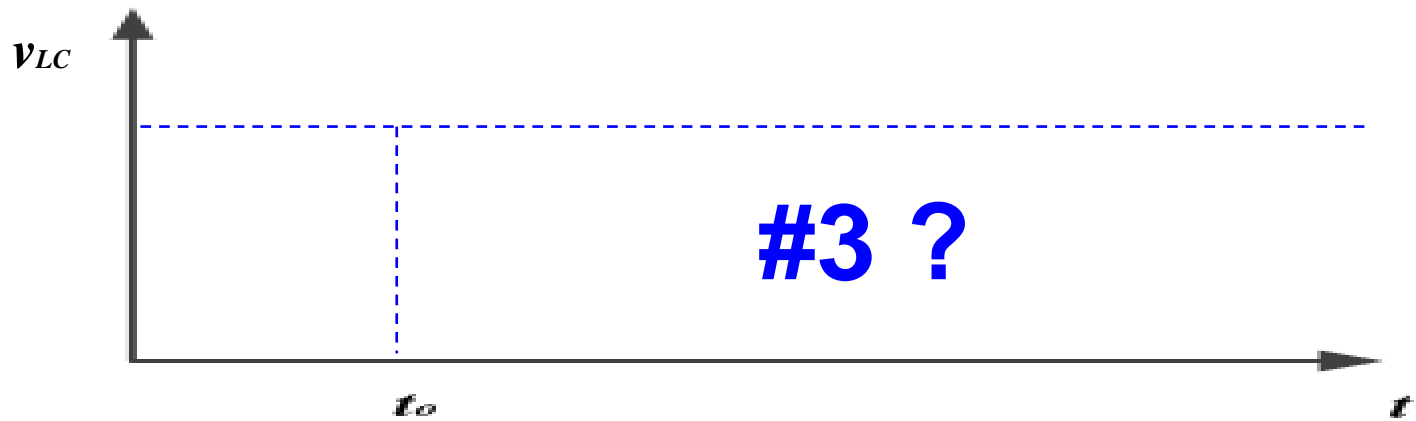
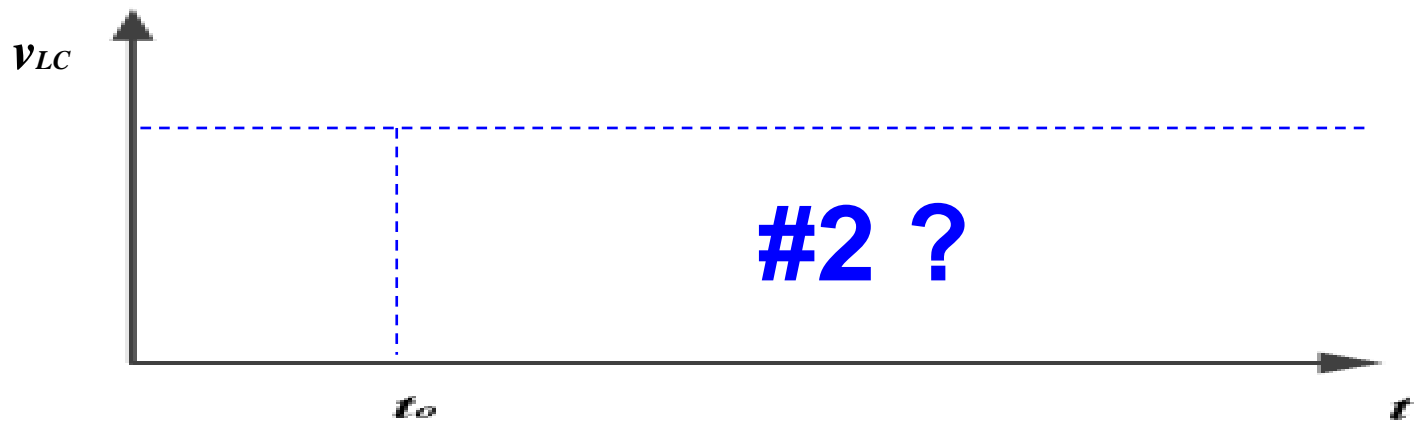
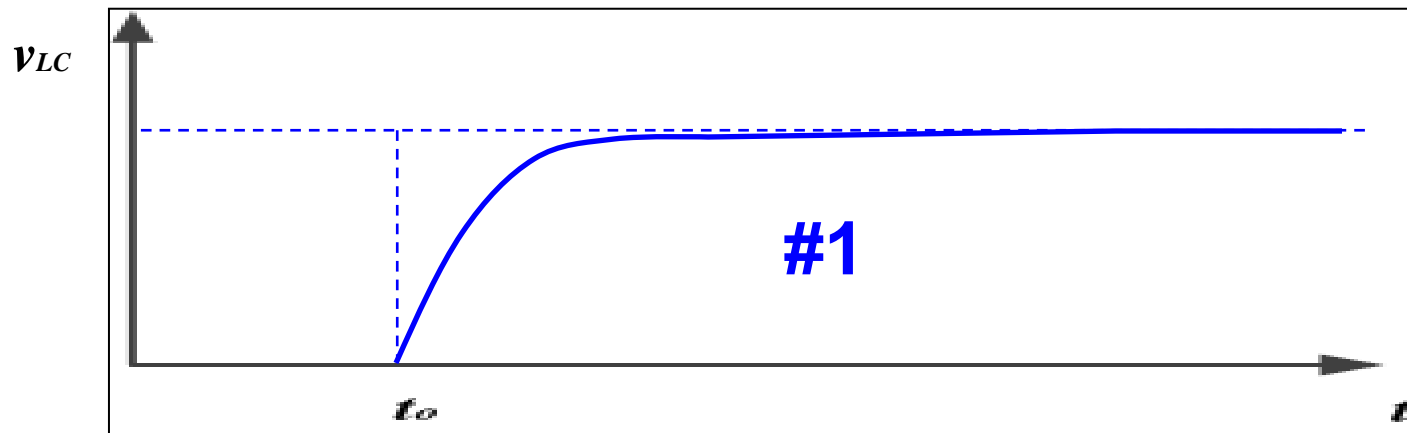


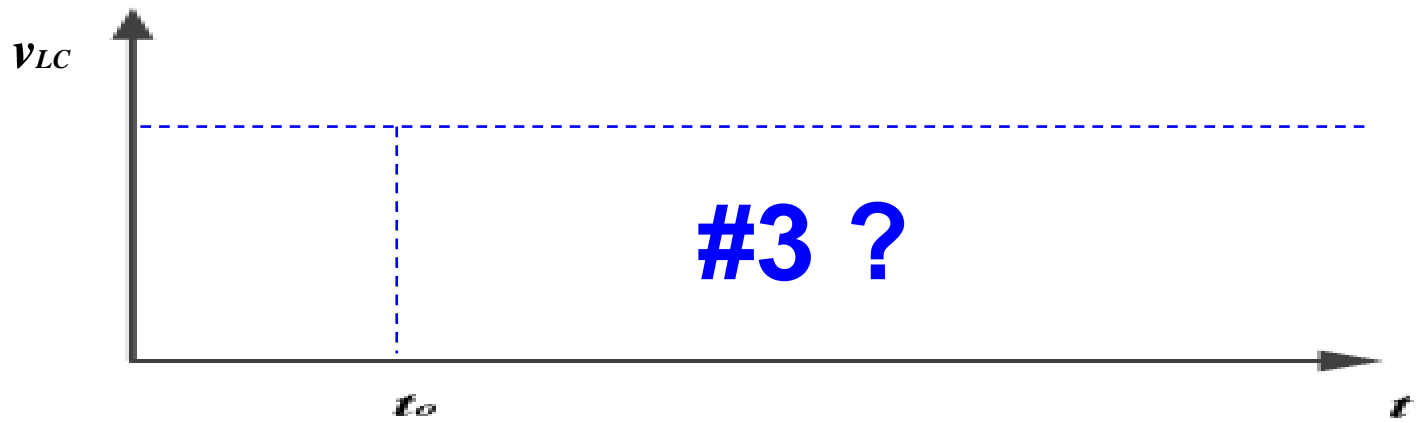
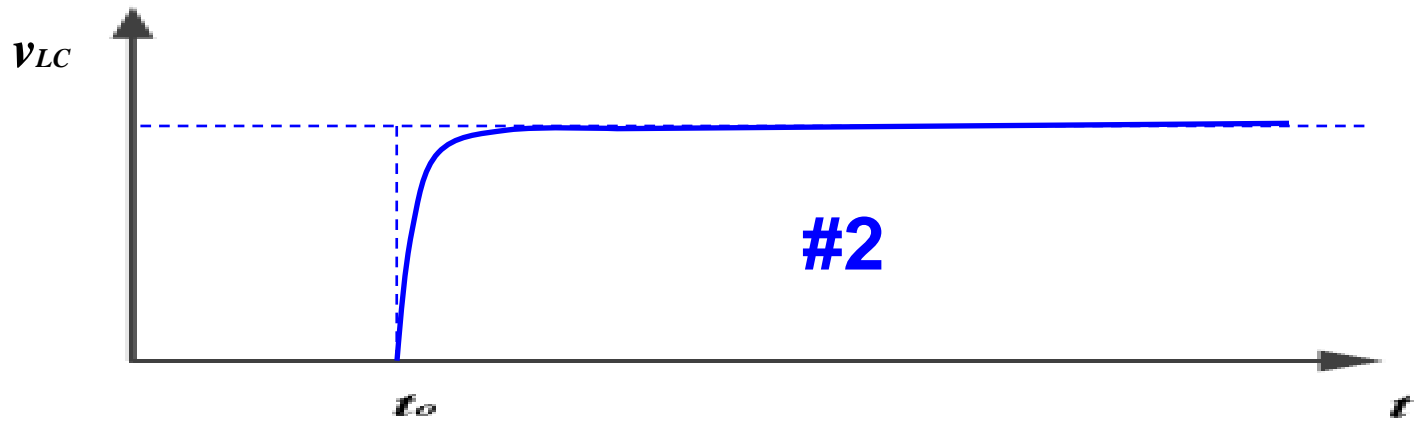
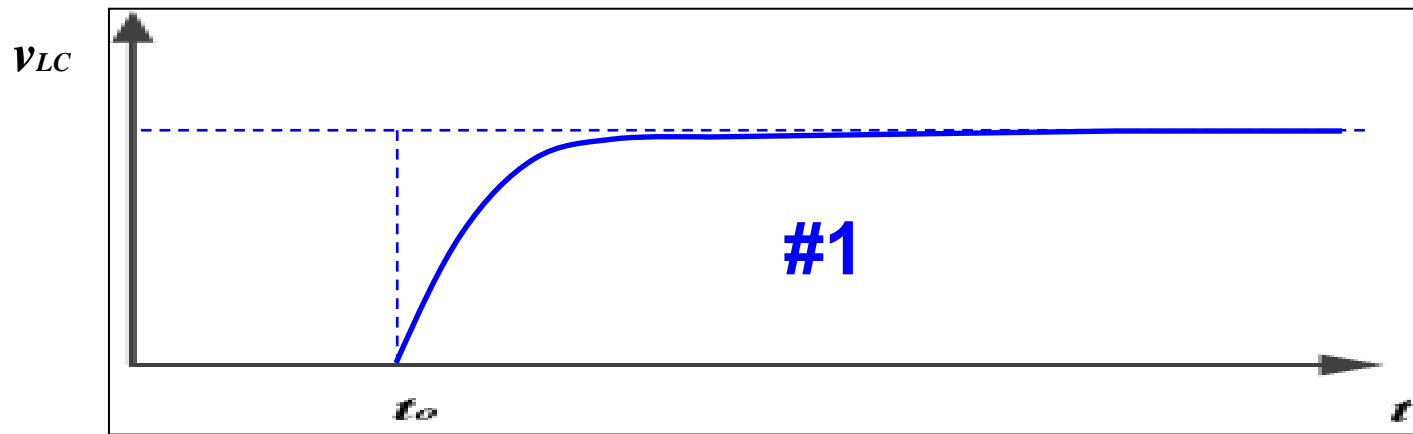
- É razoável supor que a tensão sobre LC comece a aumentar.
- O que vai ocorrer depois ?

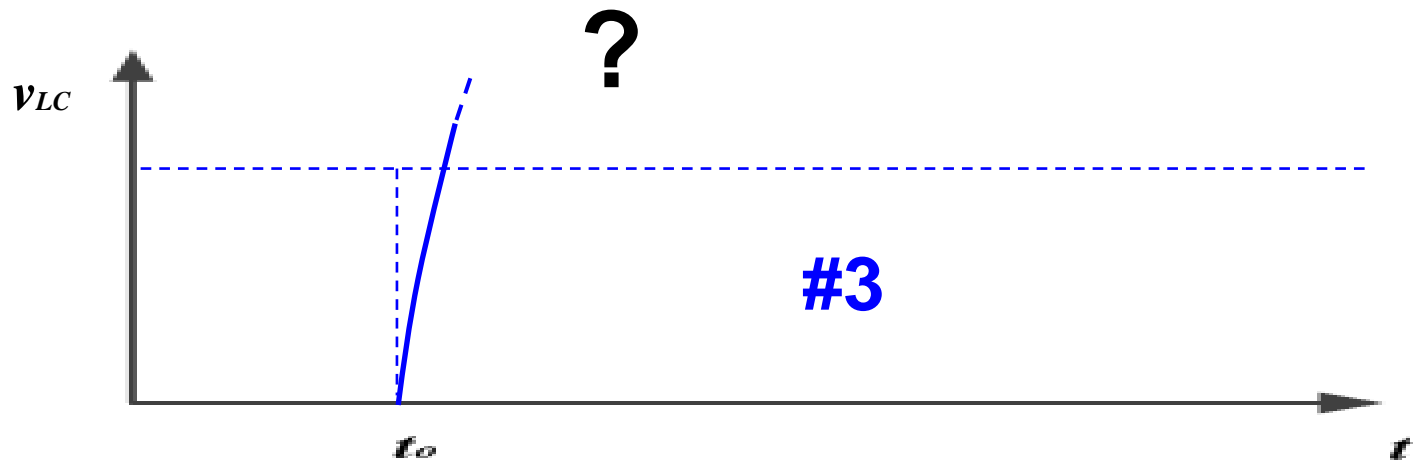
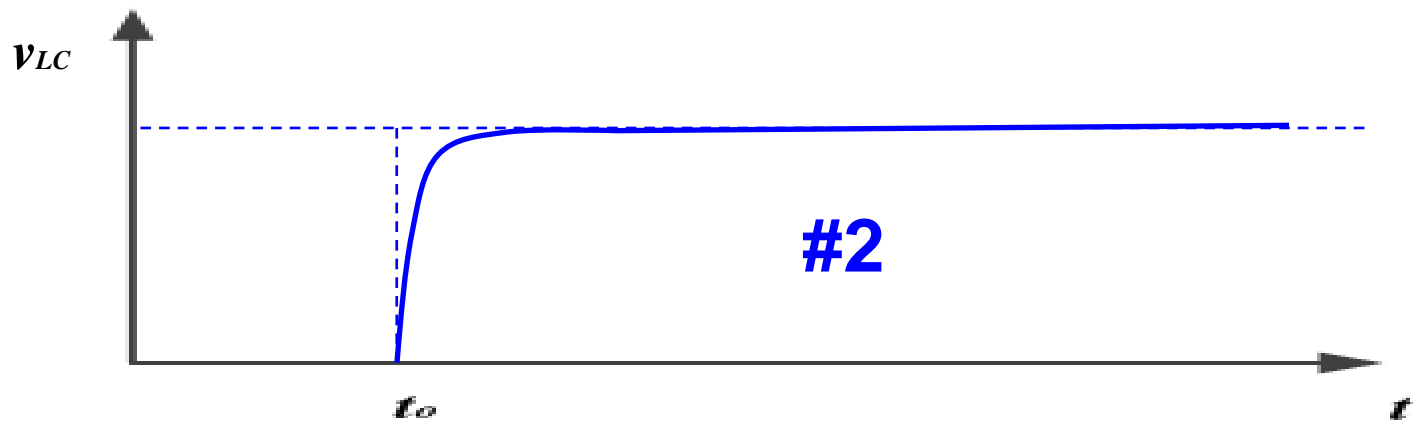
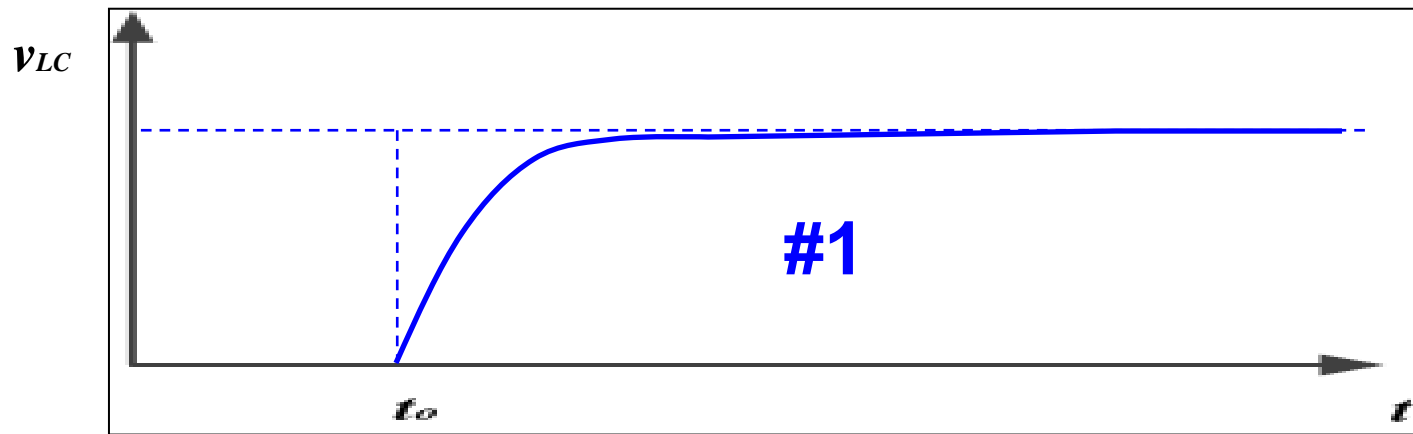


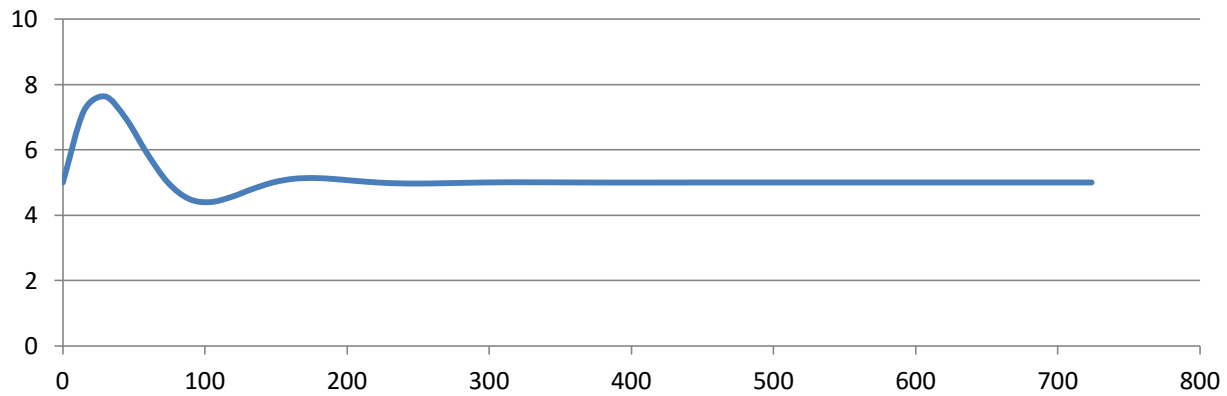
- **Precisamos lembrar do questionamento primordial do Engenheiro:**
- **O que vai ocorrer depois depende.**
- **Dependerá de vários fatores. Dos valores de R, C e L, por exemplo.**
- **Seja como for, poderá ocorrer pelo menos três tipos de comportamentos.**



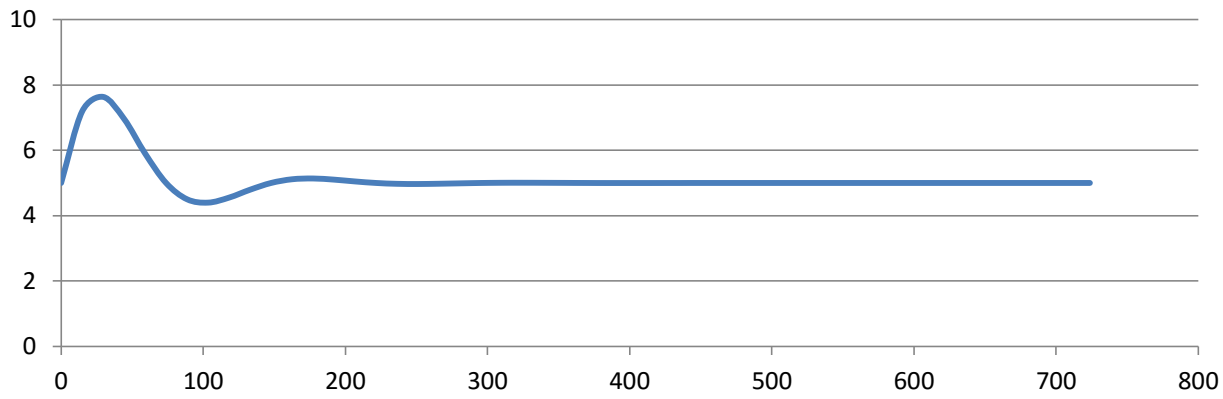




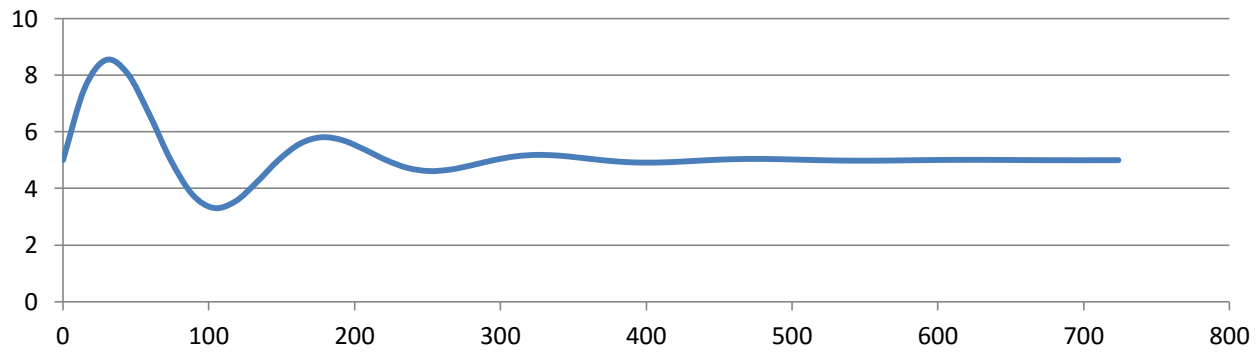




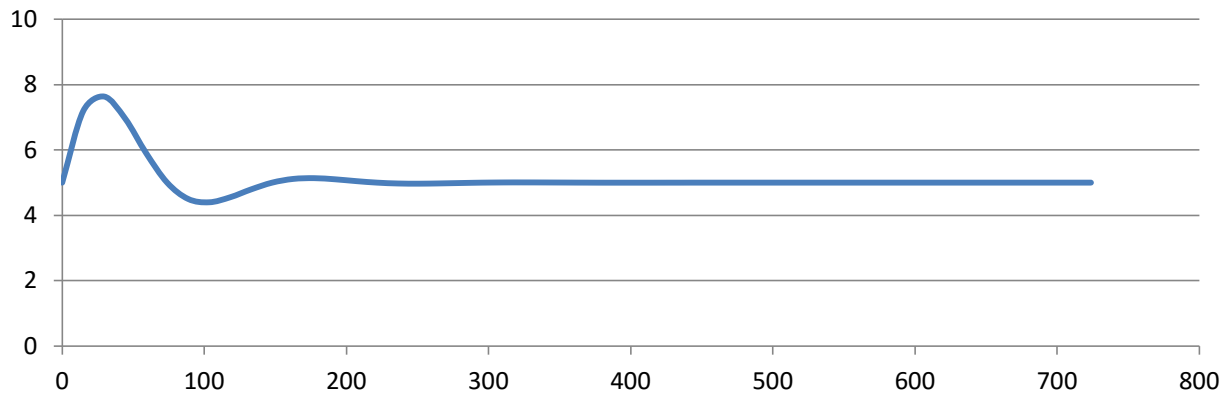
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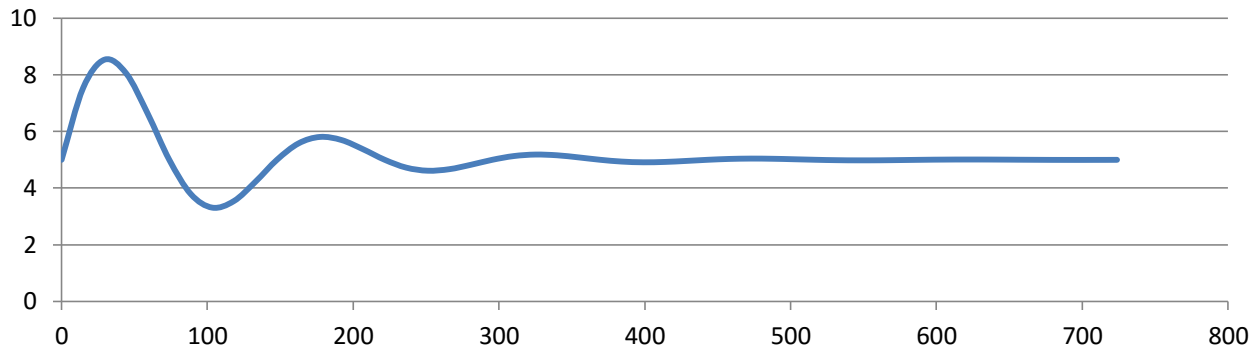
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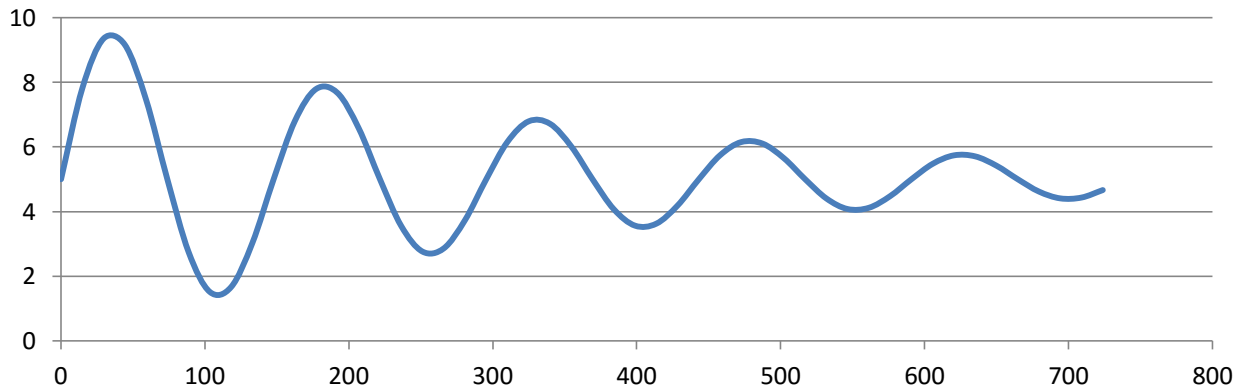
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