exponential equation with constant

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- *From*: quiasmox@xxxxxxxxx
- *Date*: 2 Jun 2005 11:51:30 −0700

I had a problem in an electrical circuits class, which was to find the point at which the voltage on two exponential curves is equal. These were the decaying voltage on an inductor and the rising voltage on a capacitor, the curves starting from a fixed voltage and from zero (respectively) at the same instant. The equated formulas were
VL = 2* exp(−2000t) = 1 − exp(−1000t) = VC
By luck, I found I could solve it for t by turning it into a quadratic−
let y = exp(−1000t)
2y^2 + y − 1 = 0 = (2y−1)(y+1)
Then, using (2y−1),
2 exp(−1000t) = 1,
ln(2) = 1000t
t = 693.2 us.

This solution depends on the coincidence that one exponent is exactly twice the other.
This brings me to the question −− is there a way, other than computer simulation, to solve a*exp(−ct) = 1 − b*exp(−dt) for t?

−−
john

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    - ◊ *From:* David W . Cantrell
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    - ◊ *From:* achava

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