Re: exponential equation with constant

Source: http://sci.tech−archive.net/Archive/sci.math/2005−06/msg00384.html

- *From*: "Randy Poe" <poespam−trap@xxxxxxxxx>
- *Date*: 2 Jun 2005 13:45:20 −0700

achava@xxxxxxxxxxx wrote:
> Let's see. Using your trick of letting y = exp(−ct), assuming c != 0,
> yields
>
> b*(y^(d/c)) + a*y − 1 = 0.
>
> The means of solution will now depend on the nature of d/c. If it
> happens to be 2, you have a quadratic equation and are good to go. If
> it is 3 or 4 there are exact solutions. Otherwise you need, not a
> computer simulation, but an iterative algorithm that will solve the
> equation. These should be pretty easy to come up with, or else you
> could just use the good old Newton−Raphson.

You could also use Newton−Raphson on the original:

f(t) = 1 − b*exp(−dt) − a*exp(−ct)
f'(t) = 1 + bd*exp(−dt) + ac*exp(−ct)

Iteration: t = t − f(t)/f'(t)

Here's a numerical experiment starting at t=1 using
that iteration rule:

t =
0
t =
3.999200159968006e−04
t =
6.304508579213751e−04
t =
6.899299967322885e−04
t =
6.931364420750211e−04
t =
6.931471733098213e−04
t =
6.931471805551151e−04

− Randy

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- ***References***:
    - ***exponential equation with constant***
        - *From:* quiasmox
    - ***Re: exponential equation with constant***
        - *From:* achava

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