Navadne dif. enačbe 1. reda

razpadi nestabilnih jeder
(radioaktivni razpadi)

$$\frac{dN}{dt} = -\lambda N$$

enačba z ločljivimi spremenljivkami

$$\int_{N_0}^{N(t)} \frac{dN}{N} = -\lambda \int_0^t dt$$

$$N(t) = N_0 e^{-\lambda t}$$

$$\lambda = \frac{\ln 2}{t_{1/2}} = \frac{1}{\tau}$$

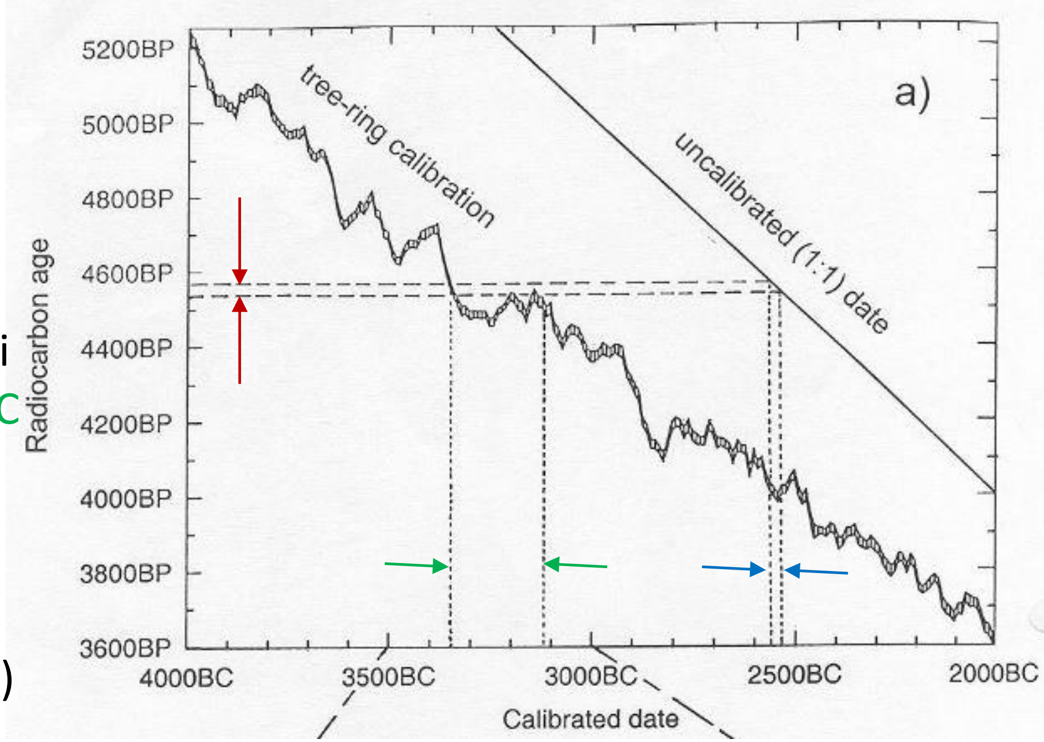
datiranje z ^{14}C
$t_{1/2}$ ~ 5730 let

$$r_{14}(t) = \frac{N(^{14}C)}{N(^{12}C)} = r_{14}^0 e^{-\lambda_{14} t}$$

$t \lesssim 20000$ let

meritev r_{14}:
4550 ± 19 let BP
⇒ 2550 ± 19 let BC

kalibracija r_{14}^0 z drevesnimi letnicami
⇒ 3360 - 3130 let BC



W. Kutschera, Vera Laboratory, Dunaj

BP: Before Present (=2000)
BC: Before Christ (=0)

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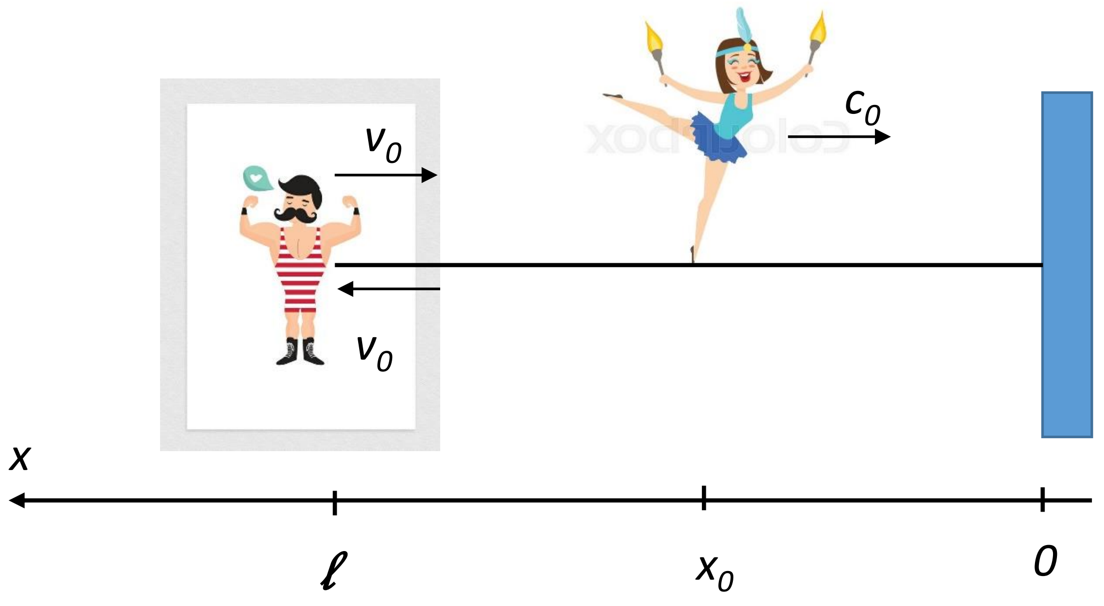
eksaktne enačbe

$$A(x,y) + B(x,y)\frac{dy}{dx} = 0$$

$$\frac{\partial A}{\partial y} = \frac{\partial B}{\partial x}$$

$$\frac{\partial \psi(x,y)}{\partial x} = A(x,y); \quad \frac{\partial \psi(x,y)}{\partial y} = B(x,y)$$



$$\frac{dx}{dt} = -(c_0 - \frac{v_0}{\ell - v_0 t}x)$$

$$\underbrace{c_0(\ell - v_0 t) - v_0 x}_{A(t,x)} + \underbrace{(\ell - v_0 t)}_{B(t,x)}\frac{dx}{dt} = 0$$

$$\psi(t,x) = (\ell - v_0 t)x + c_0 t(\ell - \frac{v_0 t}{2}) = \ell\, x_0$$

$$x' = \frac{x}{\ell}, c_0' = \frac{c_0}{v_0}, x_0' = \frac{x_0}{\ell}, t' = \frac{v_0 t}{\ell}$$

$$x'(t') = \frac{x'_0 - c'_0 t'(1 - t'/2)}{1 - t'}$$

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rešitev:

$$\psi(x,y)=konst.$$

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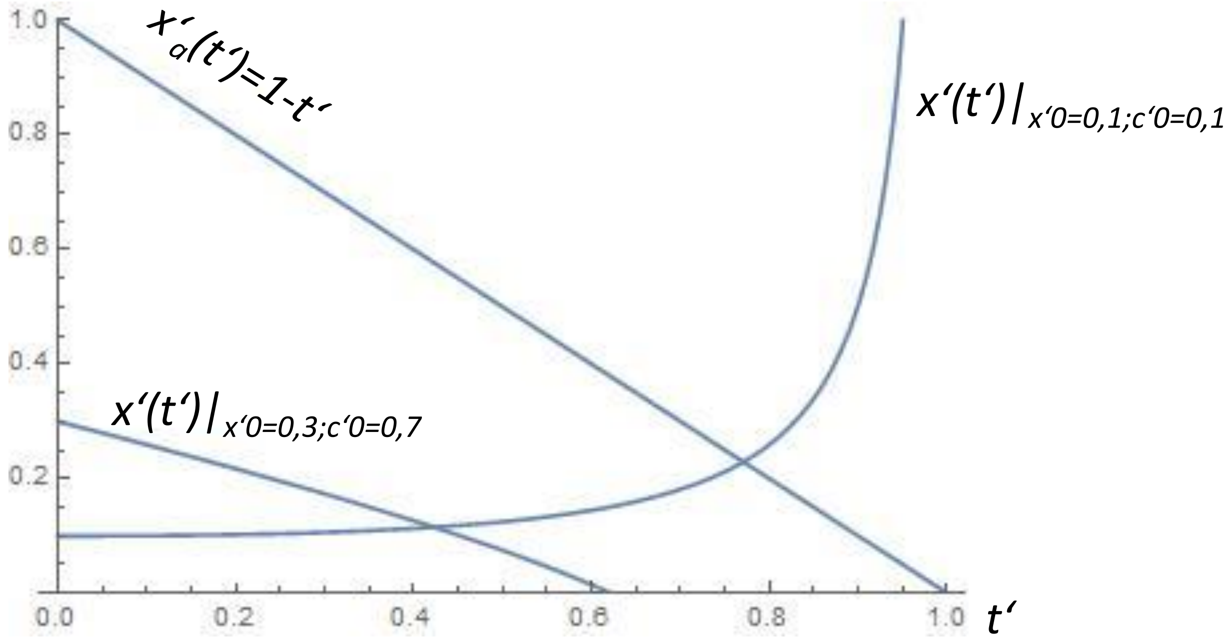

$$x_a(t')=1-t'$$

$$x'(t'_0)=0$$

$$t'_0=1-\sqrt{1-2\frac{x_0'}{c_0'}}$$

$$1-2\frac{x_0'}{c_0'}>0$$

$$\frac{x_0'}{c_0'}<\frac{1}{2}$$

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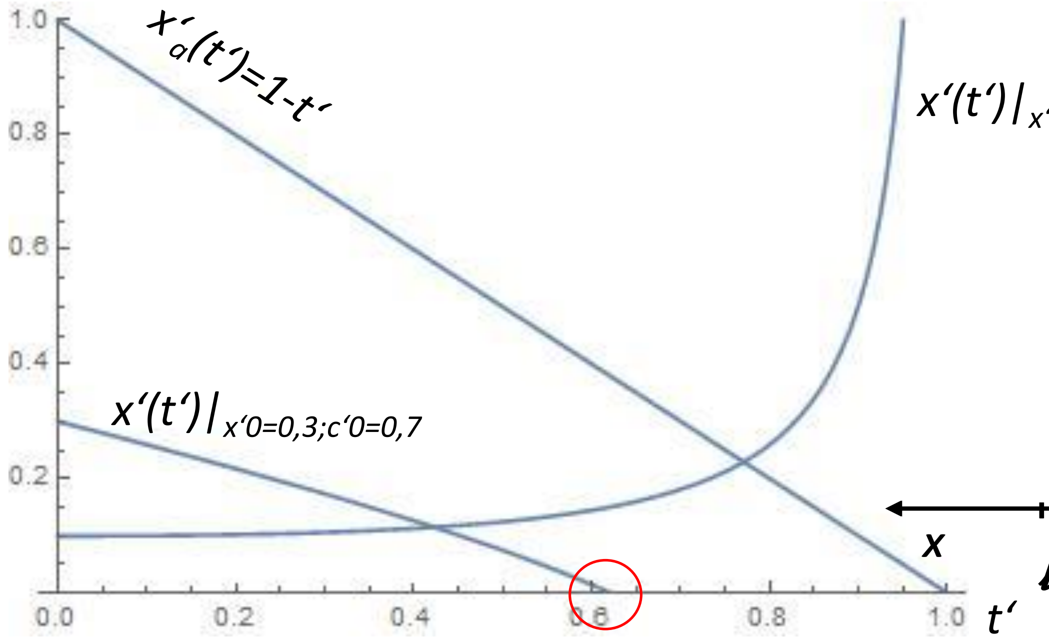

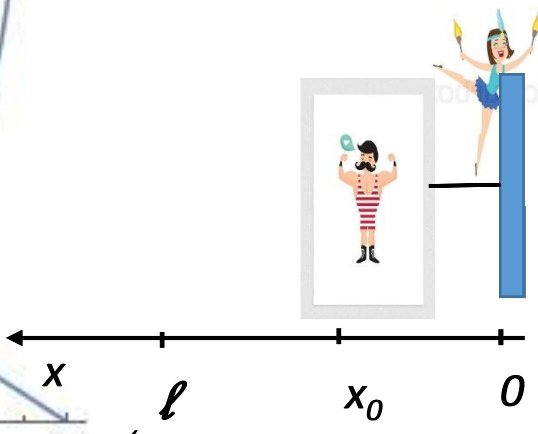

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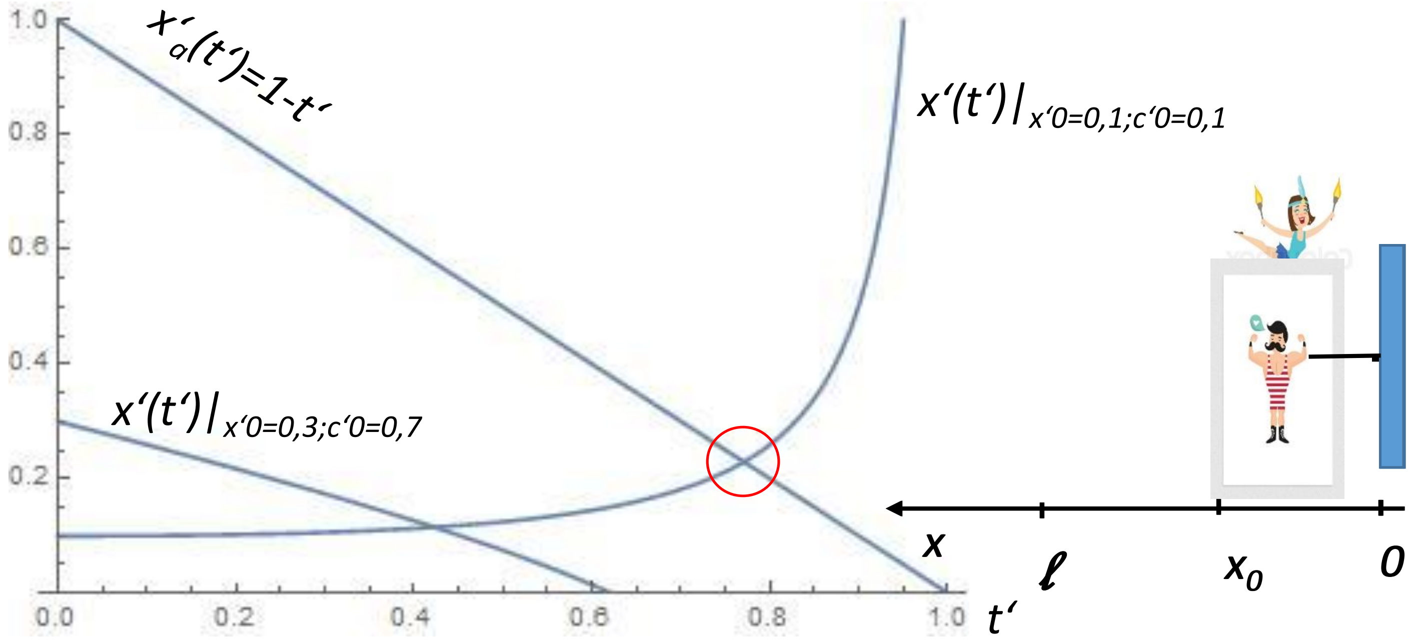

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