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> restart;
> e1:=diff(y(x),x)=sqrt((T0+mu*g*y(x))^2/(T0^2)-1);
b1:=y(0)=0;
dsolve([e1,b1],y(x));

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$$e1 := \frac{\partial}{\partial x} y(x) = \sqrt{\frac{(T0 + \mu g y(x))^2}{T0^2} - 1}$$

$$b1 := y(0) = 0$$

$$y(x) = \text{RootOf} \left(x \sqrt{\frac{\mu^2 g^2}{T0^2}} \right. \\ \left. - \ln \left(\frac{\mu g T0 + \mu^2 g^2 _Z + \sqrt{\frac{\mu g _Z (2 T0 + \mu g _Z)}{T0^2}} T0^2 \sqrt{\frac{\mu^2 g^2}{T0^2}}}{T0^2 \sqrt{\frac{\mu^2 g^2}{T0^2}}} \right) + \ln \left(\frac{\mu g}{T0 \sqrt{\frac{\mu^2 g^2}{T0^2}}} \right) \right)$$

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> e3:=x*sqrt(mu^2*g^2/T0^2)-ln((mu*g*T0+mu^2*g^2*_Z+sqrt(mu*g*_Z*(2*
T0+mu*g*_Z)/T0^2)*T0^2*sqrt(mu^2*g^2/T0^2))/T0^2/(mu^2*g^2/T0^2)^(
1/2))+ln(mu*g/T0/(mu^2*g^2/T0^2)^(1/2))=0:
> e4:=solve(e3,_Z);

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$$e4 := \frac{1}{2} \frac{T0 \left(-2 e^{\left(-x \sqrt{\frac{\mu^2 g^2}{T0^2}} \right)} + \left(e^{\left(-x \sqrt{\frac{\mu^2 g^2}{T0^2}} \right)} \right)^2 + 1 \right)}{\mu g e^{\left(-x \sqrt{\frac{\mu^2 g^2}{T0^2}} \right)}}$$

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> e5:=convert(e4,trig):
> e6:=simplify(%);

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$$e6 := \frac{\left(\cosh \left(x \sqrt{\frac{\mu^2 g^2}{T0^2}} \right) - 1 \right) T0}{\mu g}$$

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> e7:=subs([T0=10,mu=0.1,g=9.8],e6);
e7 := 10.20408163 cosh(.09800000000 x) - 10.20408163
> plot(e7,x=-5..5);

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