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> #1.1
> resart :
> x := p^2 - cos(p); dx := diff(x,p); dy := (2/3*p^3 - p*cos(p) + sin(p) + C1)·dx
      x := p^2 - cos(p)
      dx := 2p + sin(p)
      y :=  $\frac{p \cos(p)^2}{2} - \frac{3 \sin(p) \cos(p)}{4} + \frac{p}{4} + 2 \sin(p) - 2p \cos(p) - \frac{2p^3 \cos(p)}{3}$ 
> y := int      - C1 cos(p) +  $\frac{4p^5}{15}$  + C1 p^2 + C2

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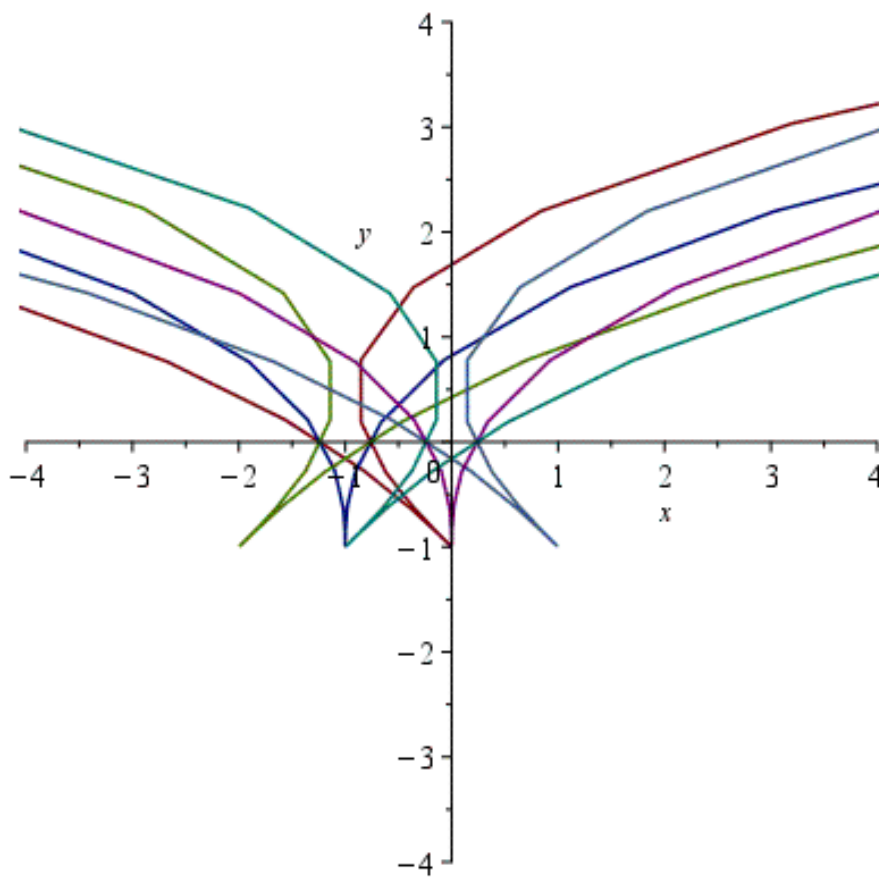
a1,a2,a3 := seq(subs(C1=i,a),i=-1..1) :
b1,b2,b3 := seq(subs(C1=i,b),i=-1..1) :
> c1,c2,c3 := seq(subs(C1=i,c),i=-1..1) :
> len := p=-20..20 :

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plot([ [a1,x,len], [a2,x,len], [a3,x,len], [b1,x,len], [b2,x,len], [b3,x,len]], x=-4..4,y=
-4..4)
>

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eq := y·y''-y'^2=y·y'·tanh(x);
eq := subs({y''=y(x)·z^2 + y(x)·z',y'=y(x)z},eq);
eq := simplify(eq);
#eq:=int(1/z,z))=int((tanh(x)),x);
>
>
>

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$$eq := y(x) \left( \frac{d^2}{dx^2} y(x) \right) - \left( \frac{d}{dx} y(x) \right)^2 = y(x) \left( \frac{d}{dx} y(x) \right) \tanh(x)$$

$$eq := y(x) \left( y(x) z(x)^2 + y(x) \left( \frac{d}{dx} z(x) \right) \right) - y(x)^2 z(x)^2 = y(x)^2 z(x) \tanh(x)$$

$$eq := y(x)^2 \left( \frac{d}{dx} z(x) \right) = y(x)^2 z(x) \tanh(x)$$

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> y_ := ln(|y|)=C1·sinh(x) + C2

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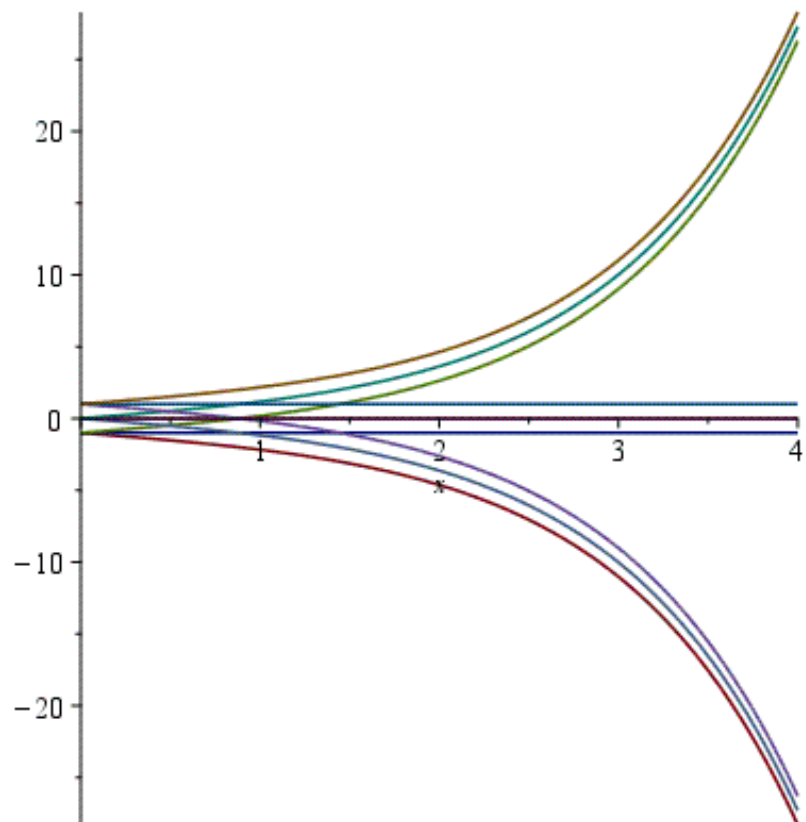
a1,a2,a3 := seq(subs(C1=i,a),i=-1..1) :
> b1,b2,b3 := seq(subs(C1=i,b),i=-1..1) :
> c1,c2,c3 := seq(subs(C1=i,c),i=-1..1) :

```

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plot([rhs(a1),rhs(a2),rhs(a3),rhs(b1),rhs(b2),rhs(b3),rhs(c1),rhs(c2),rhs(c3)],x=0
..4)
>

```



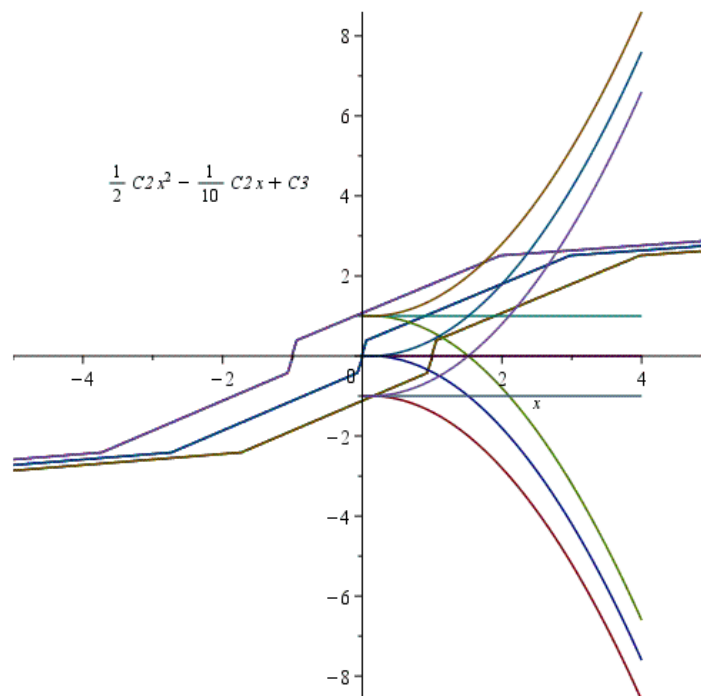
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b1,b2,b3 := seq(subs(C3=i,b),i=-1..1):
c1,c2,c3 := seq(subs(C3=i,c),i=-1..1):
pl2 := plot([a1,a2,a3,b1,b2,b3,c1,c2,c3],x=0..4):
plots[display]([pl1,pl2]);

```

$$x := \frac{z^9}{190}$$

$$y_- := \frac{81 z^{19}}{190} + C1$$



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len := z = -20..20
y := 1/2 C2 x^2 - 1/10 C2 x + C3

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> **#Task 1.4**

> 
$$eq := y'' = 2 \left( \frac{y'}{x} - \frac{y}{x^2} \right) + \frac{1}{x^2} \cdot \cos\left(\frac{1}{x}\right)$$

>  $y_- := dsolve(eq); y := rhs(y_-)$

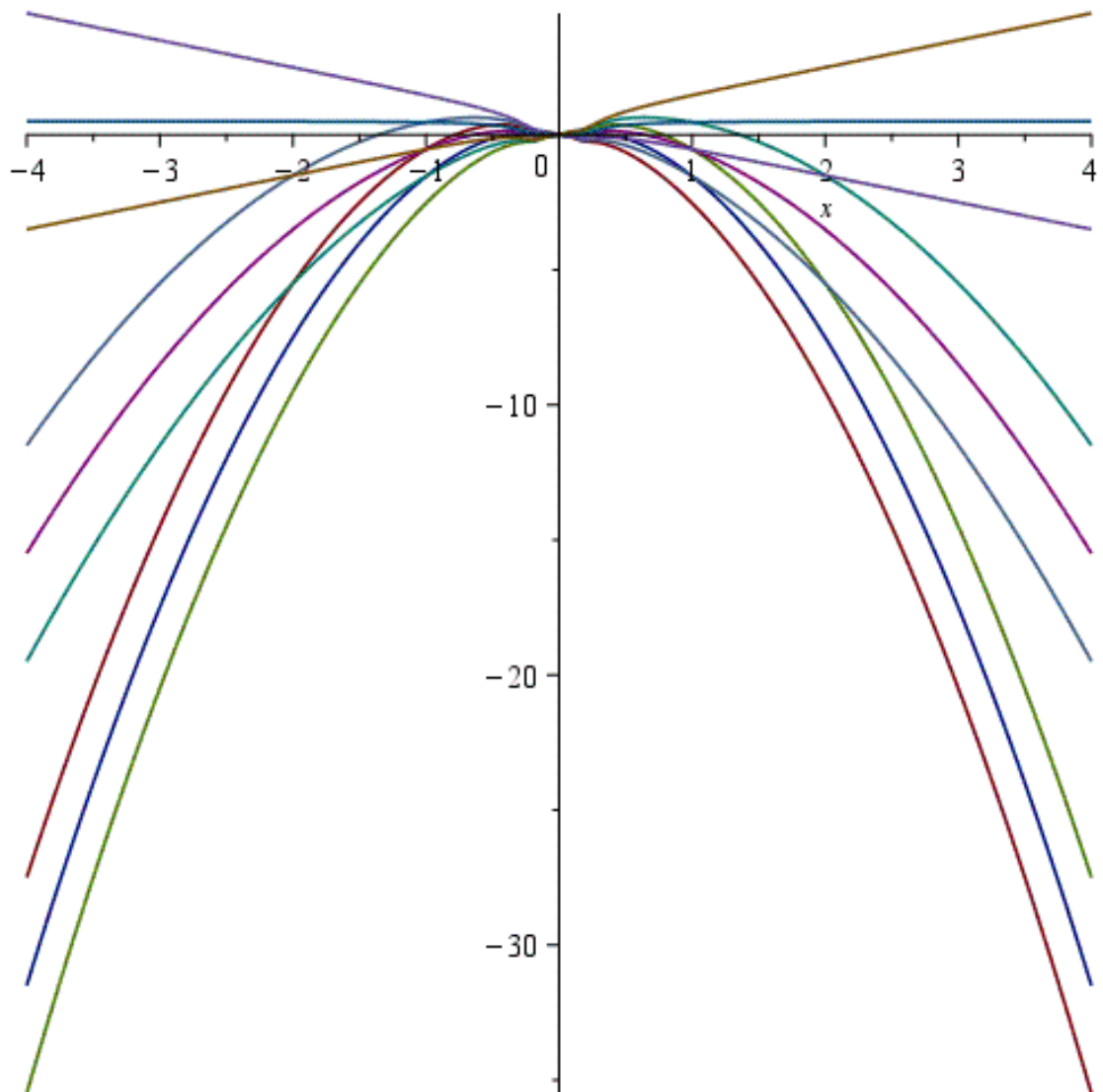
$a, b, c := seq(subs(_C2=i, y), i = -1 .. 1) :$

$a1, a2, a3 := seq(subs(_C1=i, a), i = -1 .. 1) :$

$b1, b2, b3 := seq(subs(_C1=i, b), i = -1 .. 1) :$

$c1, c2, c3 := seq(subs(_C1=i, c), i = -1 .. 1) :$

>  $pl2 := plot([a1, a2, a3, b1, b2, b3, c1, c2, c3], x = -4 .. 4);$



> **#Task 2.**

>

>  $de := \tan(x) \cdot \text{diff}(\text{diff}(y(x), x), x) - \text{diff}(y(x), x) + \frac{1}{\sin(x)} = 0$

>

$$de := \tan(x) \left( \frac{d^2}{dx^2} y(x) \right) - \frac{d}{dx} y(x) + \frac{1}{\sin(x)} = 0$$

>  $\text{simplify}(\text{dsolve}(de))$

$$y(x) = -_C1 \cos(x) + \frac{\ln\left(\frac{1 - \cos(x)}{\sin(x)}\right)}{2} + _C2$$

> **#Task 3.**

>  $\text{restart};$

>  $de := \text{diff}(\text{diff}(y(x), x), x)$

>  $de := \frac{d^2}{dx^2} y(x) + 2 \left( \frac{d}{dx} y(x) \right) + 5 y(x) = -\sin(2x)$

>  $\text{dsolve}(de)$

$$y(x) = e^{-x} \sin(2x) _C2 + e^{-x} \cos(2x) _C1 - \frac{1}{17} \sin(2x) + \frac{4}{17} \cos(2x)$$