p1ed

(parcialillo 1 de ecuaciones)

Problema 1.

```
var('x,y,t,s,C')
f=-x*y/(x^2+y^2);factor(diff(f,x)+diff(f,y)*f)
```

```
(x - y)*(x + y)*(2*x^2 + y^2)*y/(x^2 + y^2)^3
```

```
H=y^2*(2*x^2+y^2);factor(diff(H,x)/diff(H,y))+f,solve(H==C,y)[1]
```

```
(0, y == sqrt(sqrt(x^4 + C) - x^2))
```

```
Y=function('Y',x);desolve(diff(Y,x)==-x*Y/(x^2+Y^2),Y)
```

```
1/2*x^2*Y(x)^2 + 1/4*Y(x)^4 == c
```

Problema 2.

```
f=sqrt(t)-y;solve(diff(f,t)+diff(f,y)*f==0,y)
```

```
[y == 1/2*(2*t - 1)/sqrt(t)]
```

```
Y=function('Y',t);ec=diff(Y,t)==sqrt(t)-Y;desolve(ec,Y)
```

```
-1/2*(-I*sqrt(pi)*erf(I*sqrt(t)) - 2*sqrt(t)*e^t - 2*c)*e^(-t)
```

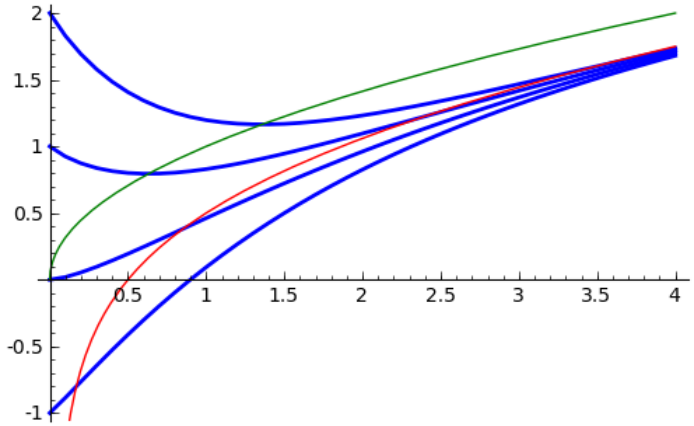
```
assume(t>0);assume(s>0)
sl(C,t)=exp(-t)*(C+integral(s^(1/2)*exp(s),s,0,t));
sl(C,t),limit(sl(C,t),t=oo);limit(sl(C,t)-t^(1/2),t=oo)
```

```
(-1/2*(-I*sqrt(pi)*erf(I*sqrt(t)) - 2*sqrt(t)*e^t - 2*C)*e^(-t),
+Infinity)
0
```

```
d1=plot(sl(1,t),0,1)
```

```
verbose 0 (3495: plot.py, generate_plot_points) WARNING: When
plotting, failed to evaluate function at 200 points.
verbose 0 (3495: plot.py, generate_plot_points) Last error messag
'unable to simplify to float approximation'
```

```
sm1=desolve_rk4(ec,Y,ics=[0,-1],step=0.1,end_points=4)
s0=desolve_rk4(ec,Y,ics=[0,0],step=0.1,end_points=4)
s1=desolve_rk4(ec,Y,ics=[0,1],step=0.1,end_points=4)
s2=desolve_rk4(ec,Y,ics=[0,2],step=0.1,end_points=4)
dm1=list_plot(sm1,plotjoined=True,thickness=2)
d0=list_plot(s0,plotjoined=True,thickness=2)
d1=list_plot(s1,plotjoined=True,thickness=2)
d2=list_plot(s2,plotjoined=True,thickness=2)
mn=plot(t^(1/2),t,0,4,color='green')
nf=plot(t^(1/2)-t^(-1/2)/2,t,0,4,color='red')
show(dm1+d0+d1+d2+mn+nf,ymin=-1,ymax=2)
```



Problema 3.

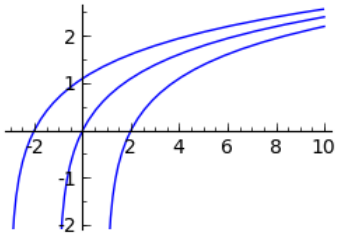
```
var('C,K,t');Y=function('Y',t);au=diff(Y,t)-exp(-Y)
desolve(au==0,Y),desolve(au==1,Y)
```

```
(e^Y(t) == c + t, log(e^Y(t) + 1) == c + t)
```

```
s0(C)=log(t+C);s1(C)=log(C*exp(t)-1)
limit(s0(C)-s0(K),t=oo),limit(s1(C)-s1(K),t=oo)
```

```
(0, log(C) - log(K))
```

```
d1=plot(s0(-1),1,10);d2=plot(s0(1),-1,10);d3=plot(s0(3),-3,10)
show(d1+d2+d3,ymin=-2,figsize=[3,2])
```




```
e1=plot(s1(1),0.16,5);e2=plot(s1(2),-1,5);e3=plot(s1(4),-1.3,5)
show(e1+e2+e3,ymin=-2,ymax=6,figsize=[3,2])
```