p1ed

(parcialillo 1 de ecuaciones)

Problema 1.

```
> f:=-x*y/(x^2+y^2):factor(diff(f,x)+diff(f,y)*f=0);
  H:=y^2*(2*x^2+y^2);normal(f+diff(H,x)/diff(H,y));solve(H=C,y);
  dsolve({diff(y(x),x)=subs(y=y(x),f)}):radsimp(%);
```

$$\frac{y\,(-y+x)\,(x+y)\,\left(y^2+2\,x^2\right)}{\left(x^2+y^2\right)^3}=0$$

$$H := y^2\,\left(y^2+2\,x^2\right)$$

$$0$$

$$\sqrt{-x^2+\sqrt{x^4+C}},\ -\sqrt{-x^2+\sqrt{x^4+C}},\ \sqrt{-x^2-\sqrt{x^4+C}},\ -\sqrt{-x^2-\sqrt{x^4+C}}$$

$$\left\{y(x)=\frac{1}{\sqrt{x^2\_C1-\sqrt{\_C1\,\left(x^4\_C1+1\right)}}}\right\}$$

Problema 2.

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

$$\frac{1}{2}\,\frac{-1+2\,t}{\sqrt{t}}$$

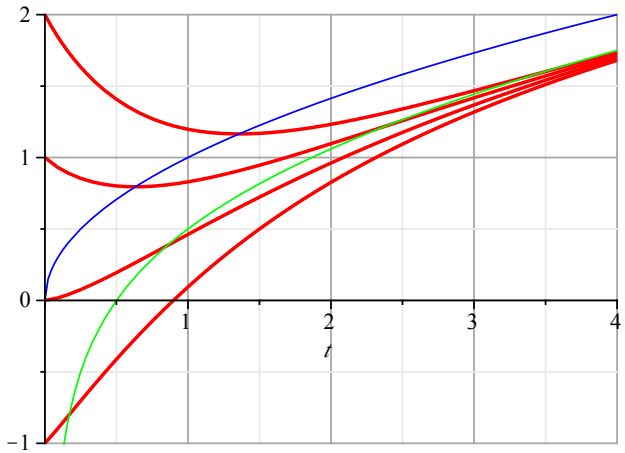
```
> dsolve(diff(y(t),t)=sqrt(t)-y(t));
```

$$y(t)=\left(\sqrt{t}\,e^{t}+\frac{1}{2}\,I\,\sqrt{\pi}\,\mathrm{erf}\left(I\,\sqrt{t}\right)+\_C1\right)e^{-t}$$

```
> sl:=C->exp(-t)*(C+int(s^(1/2)*exp(s),s=0..t)):
  [limit(sl(C),t=infinity),limit(sl(C)-t^(1/2),t=infinity)];
```

$$[\infty,0]$$

```
> plot([sl(-1),sl(0),sl(1),sl(2),t^(1/2),t^(1/2)-t^(-1/2)/2],
  t=0..4,-1..2,colour=[red,red,red,red,blue,green],
  thickness=[2,2,2,2,1,1],gridlines=true);
```



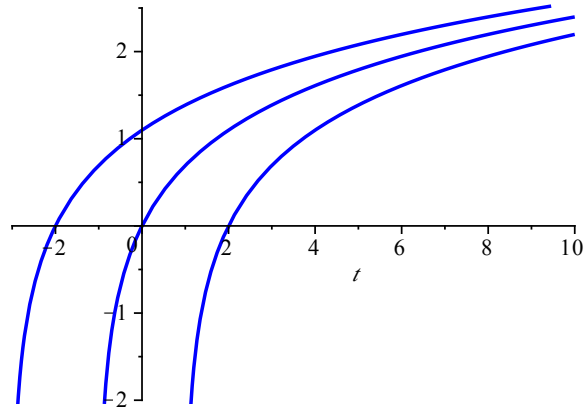
Problema 3.

```
> u:=diff(y(t),t)-exp(-y(t)):
  [dsolve({u=b,y(0)=0}),dsolve({u=1,y(0)=0}),dsolve({u=0,y(0)=a})
  ];
```

$$\left[y(t)=-\ln\left(\frac{b}{-1+e^{t\,b}+b\,e^{t\,b}}\right),\ y(t)=\ln\left(-1+2\,e^{t}\right),\ y(t)=\ln\left(t+e^{a}\right)\right]$$

```
> s0:=C->ln(t+C):limit(s0(a)-s0(b),t=infinity);
  plot([s0(-1),s0(1),s0(3)],t=-3..10,-2..2.5,
  thickness=2,colour=blue);
```

$$0$$




```
> s1:=C->ln(C*exp(t)-1):limit(s1(a)-s1(b),t=infinity);
  plot([s1(1),s1(2),s1(4)],t=-2..5,-2..6,
  thickness=[2,2,2],colour=blue);
```

$$\ln(a)-\ln(b)$$