Example with repeated eigenvalue with one-dimensional eigenspace.

x' = -5x-y
y' = 4x-y

You should check that -3 is the only eigenvalue and that [1 -2]^T is a basis for the one-dimensional eigenspace. Below we plot the vector field and six solution curves. The two solution curves in black show the eigenspace.

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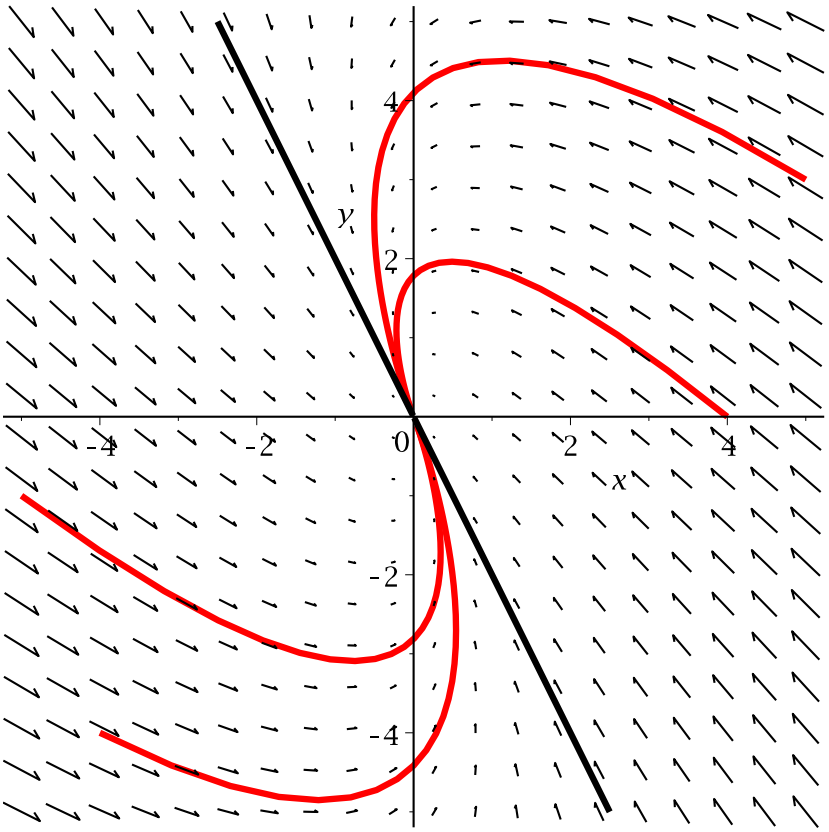
> with(DEtools):with(plots):
> solutioncurves := phaseportrait([ D(x)(t) = -5*x(t)-y(t), D(y)(t)
  = 4*x(t)-y(t)],[x(t),y(t)], t=0..2,[[x(0)=-5,y(0)=-1],[x(0)=5,y
  (0)=3],[x(0)=4,y(0)=0],[x(0)=-4,y(0)=-4],[x(0)=2.5,y(0)=-5],[x(0)
  =-2.5,y(0)=5]],linecolor=[red,red,red,red,black, black],color=
  black,arrows=none,x=-5..5,y=-5..5):
> vectorfield := fieldplot([-5*x-y, 4*x-y], x=-5..5,y=-5..5):
> display(solutioncurves,vectorfield);
```



The origin in this case is called an improper node. It is asymptotically stable. It looks like it wants to be a spiral, but could not make up its mind!