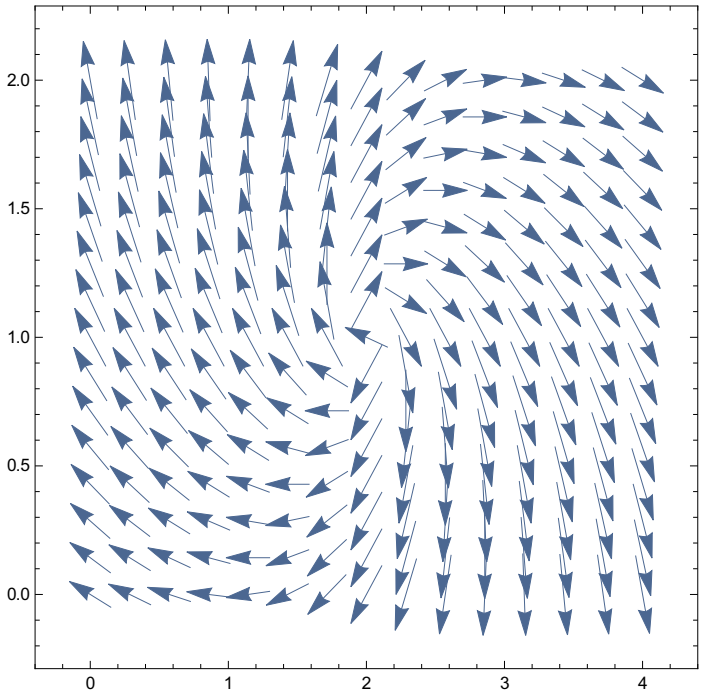
Direction Field

Brannon and Boyce 3.2.19

In[3]:=
```
df = VectorPlot[{x + y - 3, -x + y + 1} / Norm[{x + y - 3, -x + y + 1}], {x, 0, 4}, {y, 0, 2}]
```

Out[3]=



In[4]:=
```
soln[xzero_?NumericQ, yzero_?NumericQ] :=
 NDSolve[{dx'[t] == dx[t] + dy[t] - 3, dy'[t] == -dx[t] + dy[t] + 1,
   dx[0] == xzero, dy[0] == yzero}, {dx, dy}, {t, -10, 10}]
```

In[8]:=
```
xx[t_?NumericQ, xzero_?NumericQ, yzero_?NumericQ] :=
 dx[t] /. soln[xzero, yzero][[1]]
yy[t_?NumericQ, xzero_?NumericQ, yzero_?NumericQ] := dy[t] /. soln[xzero, yzero][[1]]
```

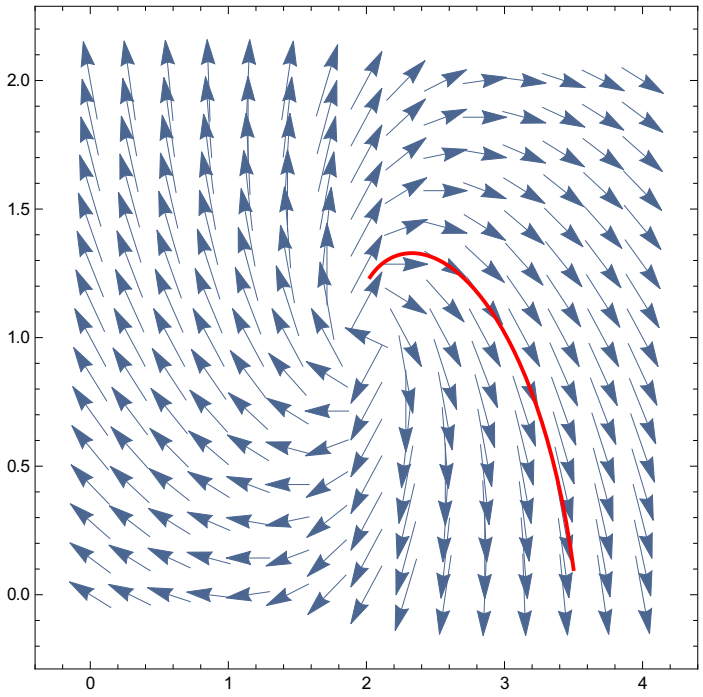
In[10]:=
```
xx[-1, 3.5, 0.1]
```

Out[10]=
```
2.57675
```

In[13]:=
```
orbit1 = ParametricPlot[
    {xx[s, 3.5, 0.1], yy[s, 3.5, 0.1]}, {s, -2, 0}, PlotStyle → {Thick, Red}];
```

In[14]:=
```
Show[df, orbit1]
```

Out[14]=



The equilibrium solves x+y = 3 and x-y = 1. That is (x*,y*) = (2,1).