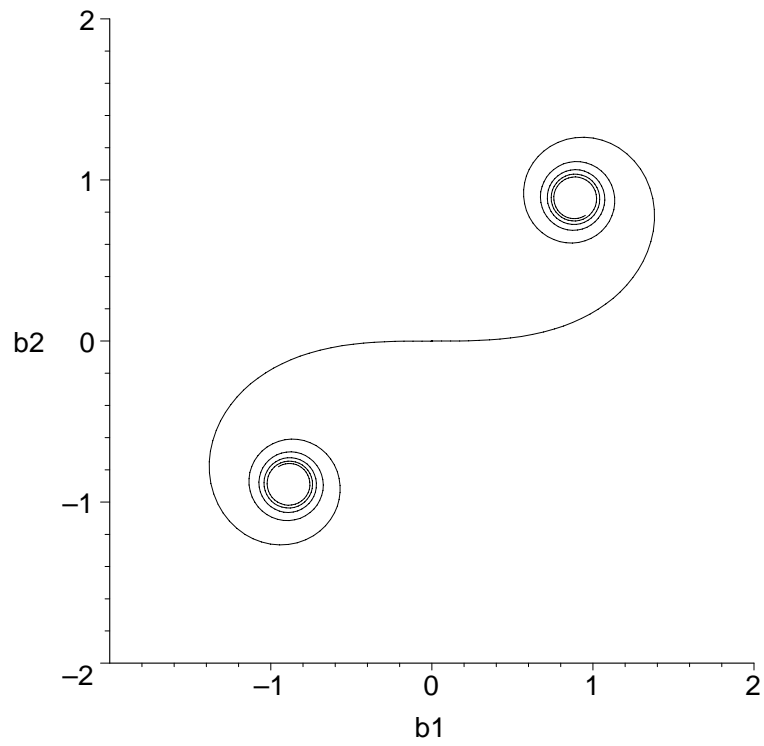


## Plane Curves, with prescribed planar curvature

Math 4530-1  
Friday January 18

In your homework you show how to reconstruct a plane curve from its planar curvature. We will use the procedure from page 48 of the text to illustrate this construction. This procedure didn't work until Gary pointed out an inappropriate "local" definition - I had defined  $b_1$  and  $b_2$  to be local, but this apparently is not consistent with the way I used them.

```
[ > restart:
[ > with(plots):with(DEtools):
Warning, the name changecoords has been redefined
[ > recreate:=proc(kap,a,b,c,d,f,g)
    #kap is curvature,
    #in plot, s ranges from a to b
    #in plot, c<=x<=d,f<=y<=g
    local
    sys, #the DE system
    ics, #initial conditions
    p, #dummy for solution to dsolve
    p1, #dummy for plot of p
    theta;
    sys:=
    diff(theta(s),s)=kap(s),
    diff(b1(s),s)=cos(theta(s)),
    diff(b2(s),s)=sin(theta(s));
    ics:=
    theta(0)=0, #start flat
    b1(0)=0, #start at origin
    b2(0)=0;
    p:=dsolve({sys,ics},{theta(s),b1(s),b2(s)},
    type=numeric):
    p1:=odeplot(p,[b1(s),b2(s)],a..b,numpoints=50,
    thickness=1,axes=framed,color=black):
    display(p1,view=[c..d,f..g]);
    end:
[ > kap1:=t->t;
                                     kap1 := t -> t
[ > recreate(kap1,-8,8,-2,2,-2,2);
```



```
> kap5:=t->t*sin(t);
```

$kap5 := t \rightarrow t \sin(t)$

```
> recreate(kap5, -8, 8, -2, 2, 0, 4);
```

