# Computergestuetzte Mathematik zur Analysis

## Lektion 9 (12. Dezember)

```
> restart: with(plots):
```

## ebene parametrische Plots

```
> po := plot(sqrt(1-x^2),x = -1 .. 1,color = coral,thickness=2)
  ;
  pu := plot(-sqrt(1-x^2), x = -1 .. 1, color = coral,
  thickness = 2);
  display([po, pu]);
> plot([[x, sqrt(1-(x+1)^2), x = -2 .. -1], [x, x^2, x = -1 ..
  0]],thickness=2);
> plot([sin(t), cos(t), t = 0 .. 2*Pi], color = red, thickness
  = 2);
>
> plot([cos(3*t), sin(7*t), t = 0 .. 2*Pi], color =
  "DarkGreen", thickness = 2); #Lissajous-Figur
> Lis1 := [cos(7*t), sin(5*t), t = 0 .. 2*Pi];
> Lis2 := [cos(3*t), sin(7*t), t = 0 .. 2*Pi];
> plot([Lis1, Lis2], color = [green, red], thickness = 2);
> kreis := [cos,sin,0..2*Pi];
> w := seq([cos(2*Pi*j/5), sin(2*Pi*j/5)], j = 0 .. 5);
> Pentagram := [seq(w[k], k = 1 .. 6)];
> plot([kreis, Pentagram], thickness = 2, scaling =
  constrained,axes='none');
> Stern := seq([[0, 0], w[k]], k = 1 .. 5);
> plot([kreis, Pentagram, Stern], thickness = 2, scaling =
  constrained, axes = 'none');
> Pentagram2 := [seq(w[2*k mod 5+1], k = 1 .. 6)];
> plot([kreis,Pentagram2], thickness = 2, scaling =
  constrained,axes='none');
> f1:= x-> (-x)^(3/2)*((3/2)^(sqrt(-x))-floor((3/2)^(sqrt(-x)))
  );
> plot(f1(x),x=-19.7..0);
> p2:=plot([f1(x), -f1(x)],x=-19.7..0);
> display(p2);
> p3:=plot([f1(x),x+19.7,x=-19.7..0],thickness=4,color=green);
  # Aufrichten des Weihnachtsbaums
```

```
> display(p3);
> p4:=plot([-f1(x),x+19.7,x=-19.7..0],thickness=4,color=green);
> p5:=plot([[-2,0],[-2,-3],[2,-3],[2,0]],thickness=4,color=
  brown):
> display(p3,p4,p5,axes=none);
```

## Raumkurven / Wiederholung

```
> restart:
> with(plots):
> kurve := (2 - cos(t/6))*cos(t), (2 - cos(t/6))*sin(t), t/8;
```

Achtung: kurve ist eine Folge

```
> spacecurve([ kurve, t = -6*Pi .. 6*Pi], numpoints = 300,
  thickness = 5);
> kurve := [t, k, exp(-k^2*t^2), t = -2 .. 2];
> kurvenmenge := { seq(kurve, k = 1 .. 7) };
> spacecurve(kurvenmenge, axes =  frame, thickness = 3);
> kurve := (5+cos(21*t))*cos(2*t), (5+cos(21*t))*sin(2*t), sin
  (21*t);
> spacecurve([kurve, t = 0 .. 2*Pi], numpoints = 500, thickness
  = 3);
> j := 'j':
> n := 500;
> rgb_wert := evalf(sin(j*Pi/n)^2), 0, evalf(cos(j*Pi/n)^2);
> for j from 1 to n do;
>   p1 := subs(t = (j-1)*2*Pi/n, [kurve]);
>   p2 := subs(t = j*2*Pi/n, [kurve]);
>   pl[j] := spacecurve( [p1, p2], color = COLOR(RGB,
  rgb_wert), thickness = 3):
> od:
> display(convert(pl, set));
```

## Flaechen im Raum

```
> restart:
> profil :=  cosh(t); #
> plot(cosh(t),t=-1..1);
> flaeche := [ t, cos(s)*profil, sin(s)*profil];
> plot3d(flaeche, s = 0 .. 2*Pi, t = -1 .. 1);
> plot3d(flaeche, s = 0 .. 2*Pi, t = -1 .. 1,color="DarkGreen",
  style=patchnogrid,lightmodel=light4,glossiness=0.1,viewpoint=
  "circleleft",orientation=[30,45]);
```