

# Blatt 2

## Aufgabe 5

```
> restart;  
> f := x -> x^n;
```

$$f := x \mapsto x^n \quad (1.1)$$

```
> int(f(x), x);
```

$$\frac{x^{n+1}}{n+1} \quad (1.2)$$

```
> g := x -> subs(n=-1, f(x));
```

$$g := x \mapsto \text{subs}(n = -1, f(x)) \quad (1.3)$$

```
> int(g(x), x);
```

$$\ln(x) \quad (1.4)$$

```
> # Schöner  
> f := (x, n) -> x^n;
```

$$f := (x, n) \mapsto x^n \quad (1.5)$$

```
> int(f(x, n), x);
```

$$\frac{x^{n+1}}{n+1} \quad (1.6)$$

```
> int(f(x, -1), x);
```

$$\ln(x) \quad (1.7)$$

## Aufgabe 6

```
> restart;
```

```
(a)
```

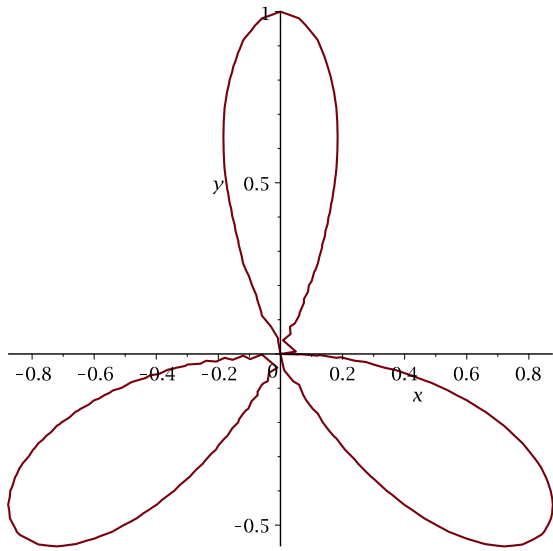
```
> with(plots):
```

```
> with(algcurves):
```

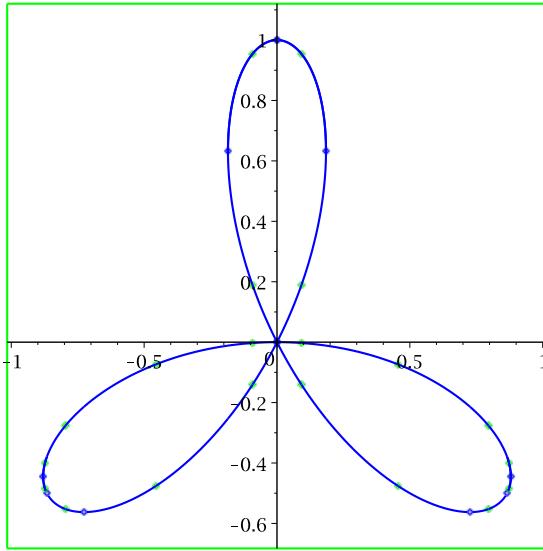
```
> g := (x^2 + y^2)^2 + 3 * x^2 * y - y^3;
```

$$g := (x^2 + y^2)^2 + 3x^2y - y^3 \quad (2.1)$$

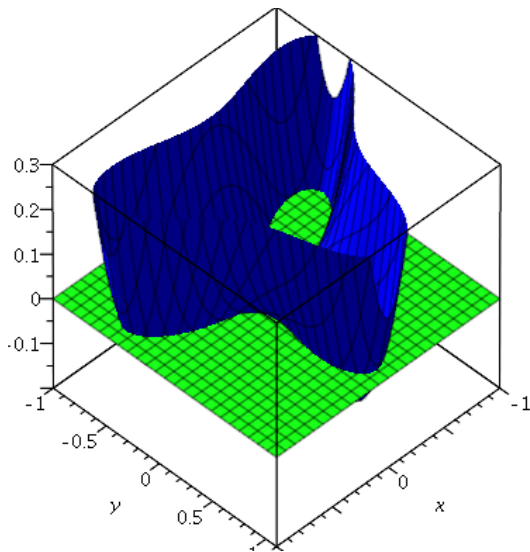
```
> implicitplot(g = 0, x = -3..3, y = -2..2, numpoints = 10000);
```



```
> plot_real_curve(g, x, y);
```



```
> plot3d([ g, 0 ], x=-1..1, y=-1..1.1, color = [ blue, green ], view = -0.2..0.3);
```



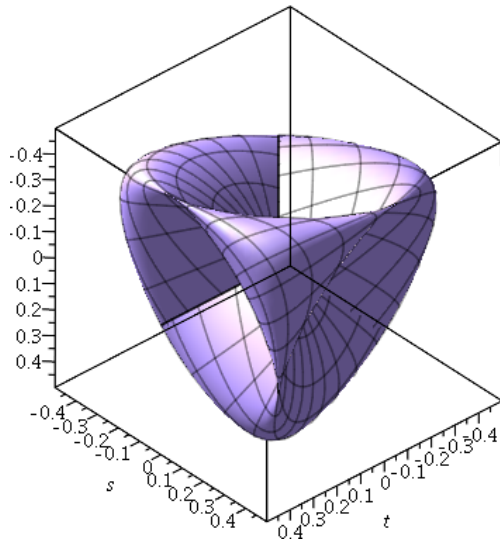
(b)

```
> f := [
  1/2 * cos(t)^2 * sin(2*s),
  1/2 * sin(s) * sin(2*t),
  1/2 * cos(s) * sin(2*t)
];
```

$$f := \left[ \frac{\cos(t)^2 \sin(2s)}{2}, \frac{\sin(s) \sin(2t)}{2}, \frac{\cos(s) \sin(2t)}{2} \right]$$

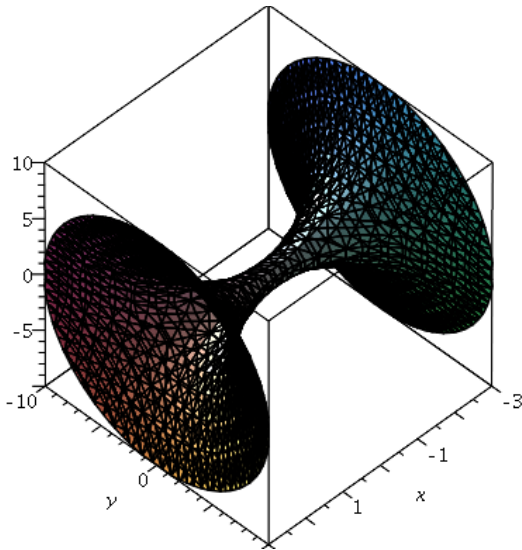
(2.2)

```
> plot3d(f, t = 0..Pi, s = 0..Pi, numpoints = 2500, color = [ 0.7,0.6,1 ], orientation = [ 48, -55 ], thickness = 1);
```



## ▼ Aufgabe 7

```
> restart;  
> with(plots):  
> implicitplot3d(cosh(x)^2 = y^2 + z^2, x=-3..3, y=-10..10, z = -10..10, numpoints = 10000);
```



## Aufgabe 8

```
> restart;
```

```
(a)
```

```
> q := x -> f(x) / g(x);
```

$$q := x \mapsto \frac{f(x)}{g(x)} \quad (4.1)$$

```
> Dq := x -> diff(q(x), x);
```

$$Dq := x \mapsto q'(x) \quad (4.2)$$

```
> simplify(int(Dq(x), x) - q(x));
```

$$0 \quad (4.3)$$

```
(b)
```

```
> c := x -> int(f(x - xi) * g(xi), xi = 0..x);
```

$$c := x \mapsto \int_0^x f(x - \xi) g(\xi) d\xi \quad (4.4)$$

```
> diff(c(x), x); Dc := x -> diff(c(x), x):
```

$$\int_0^x D(f)(x - \xi) g(\xi) d\xi + f(0) g(x) \quad (4.5)$$

```
> diff(int(Dc(x), x) - c(x), x);
```

```
(4.6)
```

[L

0

(4.6)