# Oefening 1

# Oefening 2

```
> restart:with(inttrans):with(plots):
  assume(t>0):assume(sigma>0):assume(d>0):
```

## Initiële verdeling

```
> phi0 := x -> n0*exp(-x**2/sigma**2);
```

$$\phi 0 := x \mapsto n0 \cdot e^{-\frac{x2}{\sigma 2}} \tag{2.1}$$

```
> PHI0 := simplify(fourier(phi0(x), x, k));
```

$$PHI0 := n0\, e^{-\frac{k2\, \sigma\sim^2}{4}}\, \sigma\sim \sqrt{\pi} \tag{2.2}$$

```
> PHI  := exp(-d*(k**2+K**2)*t)*PHI0;
```

$$PHI := e^{-d\sim (K2+k2)\, t\sim}\, n0\, e^{-\frac{k2\, \sigma\sim^2}{4}}\, \sigma\sim \sqrt{\pi} \tag{2.3}$$

```
> simplify(invfourier(PHI, k, x));
```

$$\frac{\sigma\sim\, n0\, e^{\frac{-4\, K2\, d\sim^2\, t\sim^2 - K2\, d\sim\, \sigma\sim^2\, t\sim - x2}{4\, d\sim\, t\sim + \sigma\sim^2}}}{\sqrt{4\, d\sim\, t\sim + \sigma\sim^2}} \tag{2.4}$$

## Visualisatie

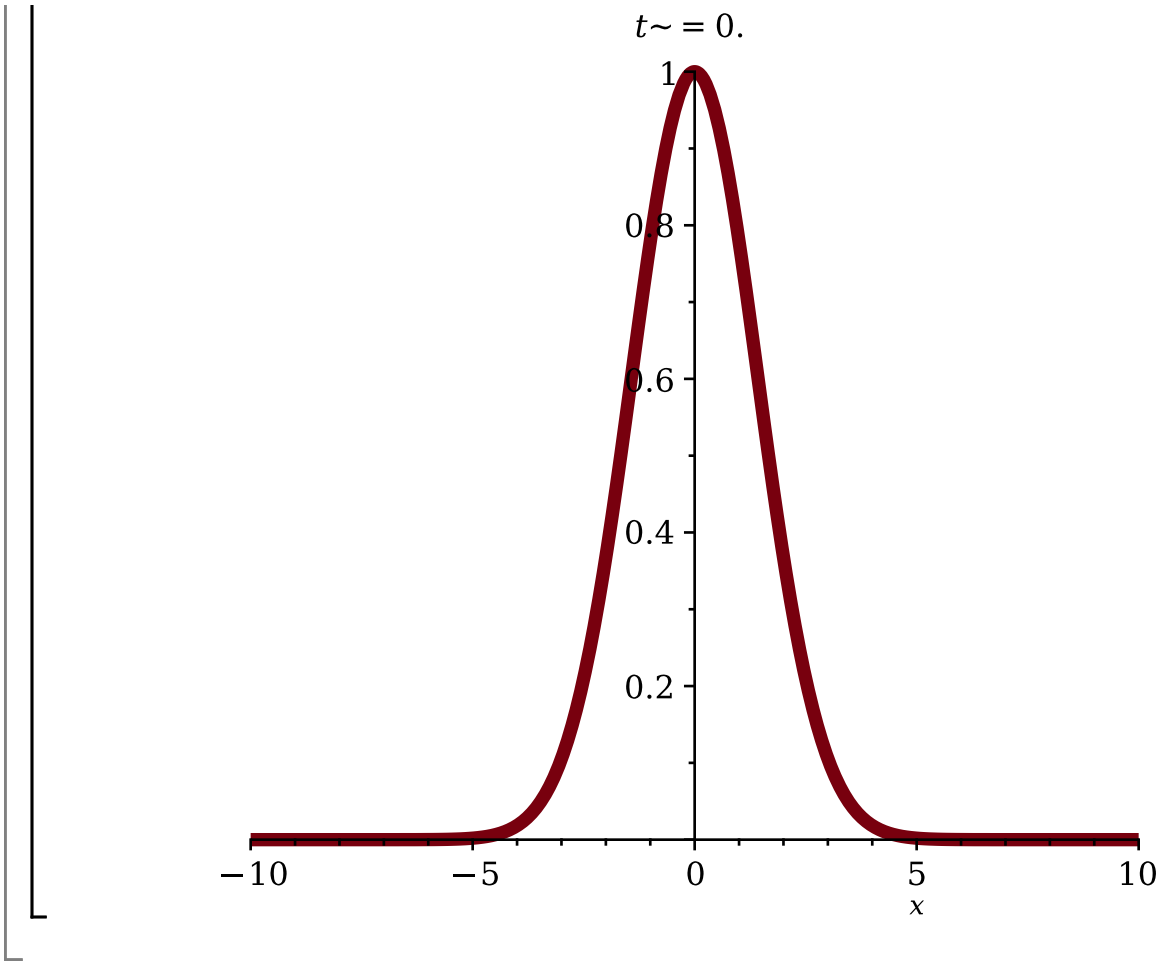
```
> phi := (x,t) -> simplify(invfourier(PHI, k, x));
```

$$\phi := (x, t) \mapsto simplify(invfourier(PHI, k, x)) \tag{2.5}$$

```
> subst := subs({sigma=2, d=2, K=1, n0=1});
```

$$subst := \{K = 1, d\sim = 2, n0 = 1, \sigma\sim = 2\} \tag{2.6}$$

```
> animate(plot, [subs(subst, phi(x,t)), x=-10..10, thickness=5],
  t=0..3, frames=200);
```


t~ = 0.
1
0.8
0.6
0.4
0.2
−10
−5
0
5
10
x