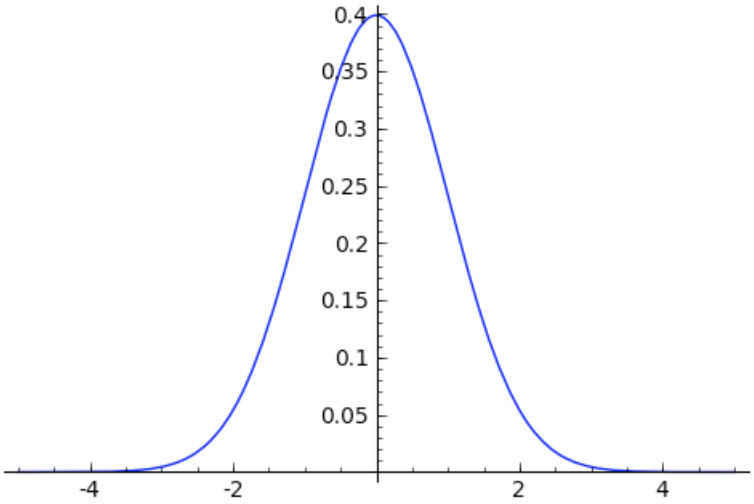
Aufgabe 9.4

```
Basiert auf "Elements of Integral Calculus using SAGE" by Dale
Hoffman, William Stein, David Joyner (2008)
```

```
plot((1/sqrt(2*pi))*exp(-x^2/2),(x,-5,5))
```




```
def simpsons_rule(f,a,b,n):
    h = (b-a)/n
    n2 = int(n/2)
    coeffs = [4,2]*n2
    coeffs = [1]+coeffs[:n-1]+[1]
    valsf = [f(a+h*i) for i in range(n+1)]
    return (h/3)*sum([coeffs[i]*valsf[i] for i in range(n+1)])
```

```
(1/sqrt(2*pi))*simpsons_rule(exp(-x^2/2),0,1,20)
```

```
    1/120*(e^(-1/2) + 4*e^(-361/800) + 2*e^(-81/200) + 4*e^(-289/800
    2*e^(-8/25) + 4*e^(-9/32) + 2*e^(-49/200) + 4*e^(-169/800) +
    2*e^(-9/50) + 4*e^(-121/800) + 2*e^(-1/8) + 4*e^(-81/800) +
    2*e^(-2/25) + 4*e^(-49/800) + 2*e^(-9/200) + 4*e^(-1/32) +
    2*e^(-1/50) + 4*e^(-9/800) + 2*e^(-1/200) + 4*e^(-1/800) +
    1)*sqrt(2)/sqrt(pi)
```

```
N(simpsons_rule((1/sqrt(2*pi))*exp(-x^2/2),0,1,20))
```

```
    0.341344762887082
```

```
Phi(t)=(1/sqrt(2*pi))*simpsons_rule(exp(-x^2/2),0,t,20)
Phi(t)
```

```
    1/120*(e^(-1/2*t^2) + 4*e^(-361/800*t^2) + 2*e^(-81/200*t^2) +
    4*e^(-289/800*t^2) + 2*e^(-8/25*t^2) + 4*e^(-9/32*t^2) +
    2*e^(-49/200*t^2) + 4*e^(-169/800*t^2) + 2*e^(-9/50*t^2) +
    4*e^(-121/800*t^2) + 2*e^(-1/8*t^2) + 4*e^(-81/800*t^2) +
    2*e^(-2/25*t^2) + 4*e^(-49/800*t^2) + 2*e^(-9/200*t^2) +
    4*e^(-1/32*t^2) + 2*e^(-1/50*t^2) + 4*e^(-9/800*t^2) +
    2*e^(-1/200*t^2) + 4*e^(-1/800*t^2) + 1)*sqrt(2)*t/sqrt(pi)
```

```
N(Phi(1))
```

```
    0.341344762887082
```

```
N(Phi(2.8))
```

```
    0.497444640538561
```

```
N(Phi(3))
```

```
    0.498649878238538
```