11-12_Kr_Problem_11.9.13_sympy

September 27, 2023

[1]:
```
from sympy import *
```

[2]:
```
var('x omega')
```

[2]:
```
(x, omega)
```

[3]:
```
f = exp(-x**2 / 2)
```

[4]:
```
diff(f, x)
```

[4]:
$$-xe^{-\frac{x^2}{2}}$$

[5]:
```
F = exp(-omega**2 / 2)
```

[10]:
```
f_prime = integrate(I * omega * F * exp(I * omega * x) / sqrt(2 * pi), (omega,␣
↪-oo, oo))
f_prime
```

[10]:
$$\frac{x\left(-2\sqrt{\pi}\left(2-\operatorname{erfc}\left(\frac{\sqrt{2}ix}{2}\right)\right)+\frac{2\sqrt{2}ie^{\frac{x^2}{2}}}{x}\right)e^{-\frac{x^2}{2}}}{4\sqrt{\pi}}+\frac{x\left(-2\sqrt{\pi}\operatorname{erfc}\left(\frac{\sqrt{2}ix}{2}\right)-\frac{2\sqrt{2}ie^{\frac{x^2}{2}}}{x}\right)e^{-\frac{x^2}{2}}}{4\sqrt{\pi}}$$

[11]:
```
f_prime.simplify()
```

[11]:
$$-xe^{-\frac{x^2}{2}}$$

[ ]:
```

```