oppgave 6

$$y'(x) + \ln x \cdot y(x) = \ln x \qquad y(1) = 0$$

for $x > 0$

$$f(x) = \ln x \qquad g(x) = \ln x$$

$$h(x) = e^{\int f(x)\,dx}$$

$$h(x) = e^{\int \ln x \, dx}$$

$$= e^{x\ln x - x + C}$$

$$h(x)\, y = \int g(x) \cdot h(x)\, dx$$

Da

$$e^{x\ln x - x}\, y = \int \ln x \, e^{x\ln x - x}\, dx$$

$$= \left| u = x\ln - x \qquad du = \ln x \right|$$

$$= \int \ln x \cdot e^{u} \, \frac{du}{\ln x}$$

$$= \int e^{u}\, du = e^{u} + C = e^{x\ln x - x} + C$$

$$e^{x\ln x - x}\, y(x) = e^{x\ln x - x} + C$$

$$y(x) = \frac{\left(e^{x\ln - x} + C\right)}{e^{x\ln x - x}}$$

$$y(1) = \frac{e^{1\ln 1 - 1} + C}{e^{1\ln 1 - 1}} = 0$$

$$\Rightarrow \frac{e^{-1} + C}{e^{-1}} = 0$$

$$C = -\frac{1}{e}$$