

# Línulegar diffurjöfnur af 1.stigi

(MATH104.5: Diffurjöfnur)

Kjartan G. Magnusson and Gunnar Stefansson

November 16, 2014

# Línulegar diffurjöfnur af 1.stigi

$$\frac{dy}{dx} + P(x)y = Q(x)$$

$$\begin{aligned}
 & x \frac{dy}{dx} = x^2 + 3y, \quad x > 0 \\
 \Rightarrow & \frac{dy}{dx} - \frac{3}{x}y = x \\
 \text{p.e. } & P(x) = -\frac{3}{x}, \quad Q(x) = x
 \end{aligned}$$

$$\begin{aligned}
 v(x) &= e^{\int P(x) dx} = e^{-\int \frac{3}{x} dx} = e^{-3 \ln x} \\
 &= e^{\ln x^{-3}} = \frac{1}{x^3}
 \end{aligned}$$

$$\begin{aligned}
 \Rightarrow \quad y(x) &= \frac{1}{v(x)} \int x \cdot \frac{1}{x^3} dx \\
 &= x^3 \int x^{-2} dx \\
 &= x^3 \cdot (-x^{-1} + C) \\
 &= Cx^3 - x^2 \quad (x > 0)
 \end{aligned}$$