# Linear and Bernoulli differential equations

**2.1**  Solve equation by doing substitution:

**a)**  $\dfrac{dy}{dx} = x + y + 3$

**b)**  $\dfrac{dy}{dx} = 5x - 3y + 7$

**c)**  $\dfrac{dy}{dx} = (x + y)^2$

**d)**  $\dfrac{dy}{dx} = \dfrac{1}{x + y}$

**e)**  $\dfrac{dy}{dx} = sin(x - y)$

**2.2**  Solve linear differential equations:

**a)**  $\dfrac{dy}{dx} - y\,\mathrm{tg}\,x = 2\sin x$

**b)**  $y' + \dfrac{y}{x} = x^2$

**c)**  $y' + 2xy = e^{-x^2}$

**d)**  $y' - 2xy = 2x^3$

**e)**  $y' + y\cos x = \sin x \cos x$

**f)**  $y' - e^x y = e^{2x}$

**g)**  $y' + \dfrac{1 - 2x}{x^2}y = 1$ ,  $y(1) = 1 + e$

**2.3**  Solve Bernoulli differential equations:

**a)**  $xy' + xy^2 - y = 0$

**b)**  $y' + xy = xy^{-3}$

**c)**  $\dfrac{dy}{dx} + \dfrac{2}{3}y = \dfrac{x}{\sqrt{y}}$

**d)**  $\dfrac{dy}{dx} + \dfrac{y}{x} = \dfrac{3\sqrt{x}}{y^2}$

**e)**  $\dfrac{y'}{\sqrt{y}} + 4x\sqrt{y} = 2xe^{-x^2}$

**f)**  $y' - 9x^2 y = (x^5 + x^2)y^{\frac{2}{3}}$