

Application I

Solve the following differential equations.

$$1. \left[2x \sin\left(\frac{y}{x}\right) + 3y \cos\left(\frac{y}{x}\right) \right] dx - 3x \cos\left(\frac{y}{x}\right) dy = 0$$

$$2. \arcsin y dx + \frac{x + 2\sqrt{1-y^2} \cos y}{\sqrt{1-y^2}} dy = 0$$

$$3. (y + y \sin x) y' = \sqrt{\cos^2 x - y^4 \cos^2 x}$$

$$4. x^4 y' + x^3 y = y^{-3} \sin x$$

$$5. y' + y^2 - y \cot x + 1 + \cot^2 x = 0 \quad y_1(x) = \cot x$$

$$6. \sqrt{1 - e^{2x}} y' = (1 + y^2) e^x$$

$$7. (x + 2y + 3) dx + (2x + 3y + 4) dy = 0$$

$$8. (x \ln x - x^2 \sin y) dy + (y + x \cos y) dx = 0$$

$$9. e^{y - xy'} = (y')^2$$

$$10. y = -xy' + (y')^2 - \frac{2}{3} (y')^3$$

$$11. y \sqrt{1 - \ln^2 y} \sin x dx + (1 + \cos^2 x) dy = 0$$