

7) DIFFERENTIAL EQUATIONS

APPLIED MATHEMATICS (FAPPZ)

From examinations. Solve the following separable equations.

- 1) $xy' - y = 0$
- 2) $xy' + y = 0$
- 3) $yy' + x = 0$
- 4) $y' = y$
- 5) $(1+x)y' = x(1-y)$
- 6) $yy' = 2x^3$
- 7) $(x^2+x)y' = 2y+1$
- 8) $y' = y^2 + 1$

Advanced. Solve the following separable equations with initial conditions.

- 9) $y = xy' - (2 + y')$, $y(2) = 5$
- 10) $y^2 - 1 + yy'(x^2 - 1) = 0$, $y(0) = 2$
- 11) $y' \operatorname{tg} x = y \ln y$, $y(\frac{\pi}{4}) = e$
- 12) $y' + 2y^2 \sin 2x = 0$, $y(0) = \frac{1}{3}$

Results.

- 1) $y = Cx$
- 2) $y = \frac{C}{x}$
- 3) $y = \pm\sqrt{C-x^2}$, $C > 0$
- 4) $y = Ce^x$
- 5) $y = 1 - C(1+x)e^{-x}$
- 6) $y = \pm\sqrt{x^4 + C}$
- 7) $y = \frac{Cx^2 + 2x + 1}{2(1+x)^2}$
- 8) $y = \operatorname{tg}(x + C)$
- 9) $y = 7x - 9$
- 10) $y = \sqrt{\frac{4+2x}{1-x}}$
- 11) $y = e^{\sqrt{2} \sin x}$
- 12) $y = \frac{1}{4 - \cos 2x}$