

First Order ODEs (H.1)

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1차 미분 방정식

ch 2.

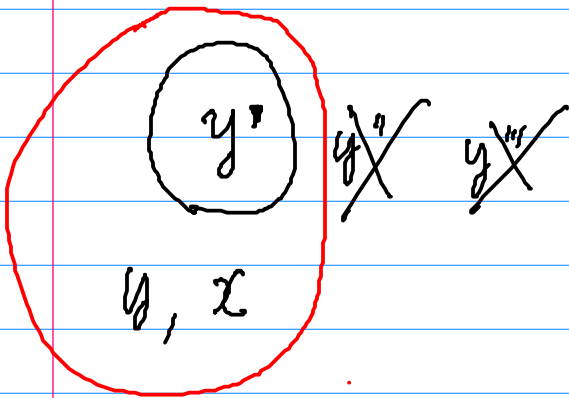
- (a) Separable eq. 변수분리 2.2
- (b) Linear eq 선형방정식 2.3
- (c) Exact eq 완전방정식 2.4

↑

1st order

differential eq

Solution: $y(x)$: y 는 x 의 함수



1차 미분 방정식

ODE Ordinary Differential Equation 상미분방정식

PDE Partial Differential Equation 편미분방정식

$$\frac{df}{dx}$$

$f(x)$ 2차원 2점

$$\frac{\partial f}{\partial x}, \frac{\partial f}{\partial y}$$

$f(x, y)$... 3차원 2점



partial derivative.

$$\frac{dy}{dx} = 6y^2 x = (6x)(y^2)$$

$$y' = \frac{3x^2 + 4x - 4}{2y - 4} = (3x^2 + 4x - 4) \left(\frac{1}{2y - 4} \right)$$

$$y' = \frac{xy^3}{\sqrt{1+x^2}} = \left(\frac{x}{\sqrt{1+x^2}} \right) (y^3)$$

$$y' = e^{-y} (2x - 4) = (2x - 4) (e^{-y})$$

$$\frac{dr}{d\theta} = \frac{r^2}{\theta} \quad r(\theta) \text{ 2. } \frac{r^2}{\theta} \text{ 0. } \text{ or } \text{ 2. } \frac{r^2}{\theta}$$

$$\frac{d}{d\theta} r(\theta) = \frac{r^2(\theta)}{\theta} \Rightarrow \underline{r(\theta)?}$$

$$\frac{dr}{d\theta} = \frac{r^2}{\theta} = \left(\frac{1}{\theta} \right) (r^2)$$

$y(t)?$

$$\frac{dy}{dt} = e^{y-t} \sec(y) (1+t^2) = \left(e^{-t} (1+t^2) \right) \left(e^y \sec(y) \right)$$

1차 미분 방정식 $y' = f(x, y)$ y(x) = ?

x에 대해서 y를
미분 x, y의 식

$$y' = g_1(x) \times g_2(y)$$

$$\underline{y'} \text{ (y 식)} = (x \text{ 식})$$

$$(y \text{ 식}) \boxed{\frac{dy}{dx} dx} = (x \text{ 식}) dx$$

↑
정리하기

$$(y \text{ 식}) dy = (x \text{ 식}) dx$$

$$\int (y \text{ 식}) dy = \int (x \text{ 식}) dx$$

1차 미분 방정식

$$y' = g(x, y)$$

$y(x)$?

x 에 대해서 y 의
미분

x, y 의 함수

Linear Eq

$$a_1(x) \boxed{y'} + a_2(x) \boxed{y} = g(x)$$

$a_1(x)$ 의 함수
에 상수

$a_2(x)$ 의 함수
에 상수

$g(x)$ 의 함수

$$1 \cdot \boxed{y'} + p(x) \boxed{y} = g(x)$$

$p(x)$ 의 함수
에 상수

$g(x)$ 의 함수

$$1. \boxed{y'} + p(x) \boxed{y} = q(x)$$

$$\frac{dv}{dt} = 9.8 - 0.196v$$

$$v(t) = ?$$

$$1. \frac{dv}{dt} + 0.196v = 9.8$$

$$\cos(x) \boxed{y'} + \sin(x) \boxed{y} = 2\cos^2(x)\sin(x) - 1$$

$$\boxed{y'} + \frac{\sin(x)}{\cos(x)} \boxed{y} = 2\cos^2(x)\sin(x) - \frac{1}{\cos(x)}$$

$$t \boxed{y'} + 2 \boxed{y} = t^2 - t + 1$$

$$\boxed{y'} + \frac{2}{t} \boxed{y} = t - 1 + \frac{1}{t}$$

$$t \boxed{y'} - 2 \boxed{y} = t^5 \sin(2t) - t^3 + 4t^4$$

$$1. \boxed{y'} - \frac{2}{t} \boxed{y} = t^4 \sin(2t) - t^2 + 4t^3$$

$$2 \boxed{y'} - \boxed{y} = 4 \sin(3t)$$

$$y(t) = ?$$

$$1. \boxed{y'} - \frac{1}{2} \boxed{y} = 2 \sin(3t)$$

