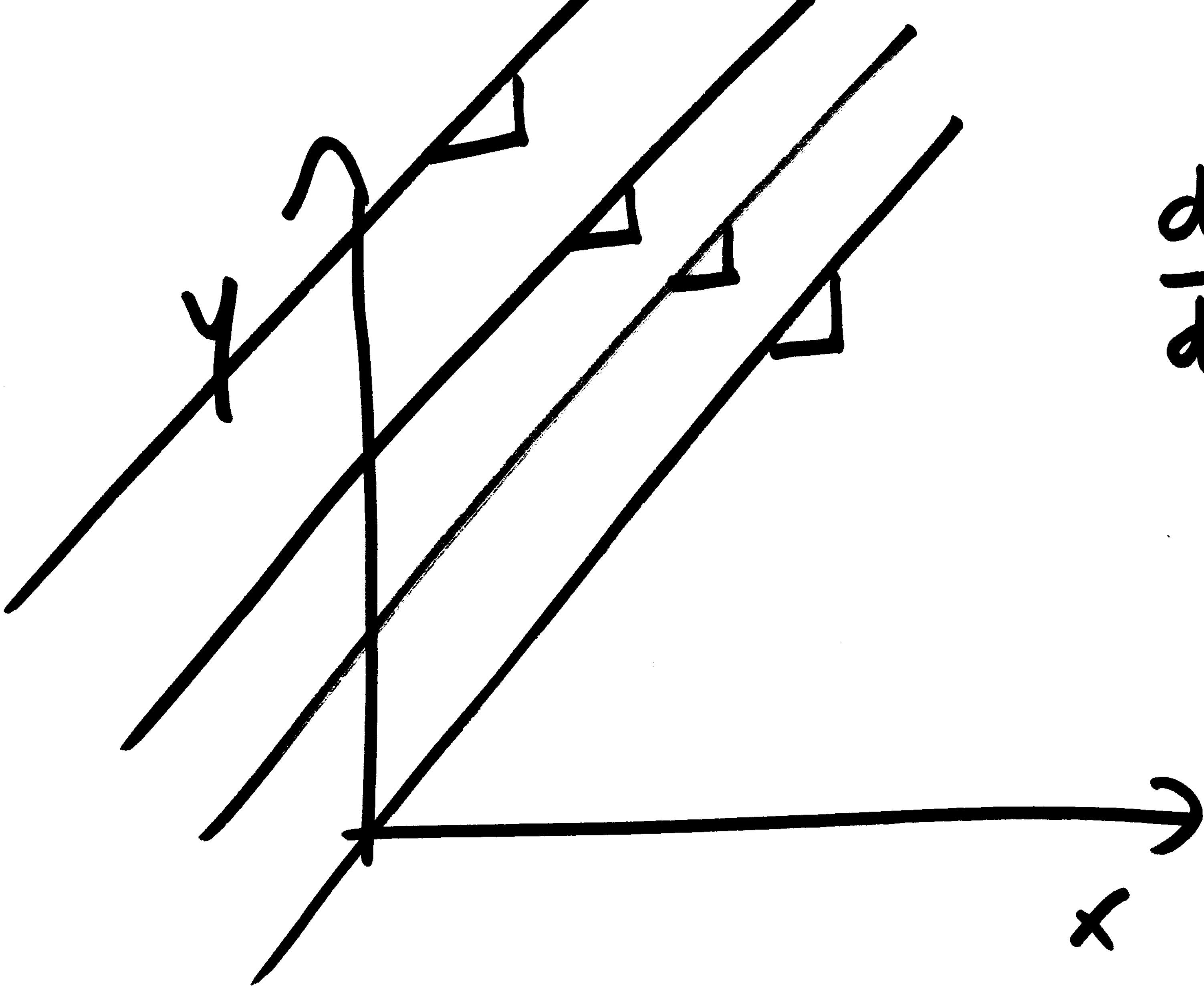
Ma. Ranjith P,
Lec - 10.
Date - 23-4-11

$$\frac{dl}{dt} = k_p - k_d$$

$$l = ?$$



$$\frac{dy}{dx} = m$$

$$\int dx = x + \text{constant}$$

$$\frac{dy}{dx} = x^n$$

$$\Rightarrow dy = x^n dx$$

$$y = \int dy = \int x^n dx = \underline{\underline{\frac{x^{n+1}}{n+1} + c}}$$

$$y = \frac{x^{n+1}}{n+1} + c$$

$$\frac{dy}{dx} = \left[\frac{1}{n+1}\right] \frac{d}{dx} x^{n+1}$$

$$\Rightarrow \frac{dy}{dx} = \left[\frac{1}{\cancel{n+1}}\right] \cancel{(n+1)}\, x^{n}$$

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$$\frac{dy}{dx} = k x^n$$

$$y = ?$$

$$\frac{dy}{dx} = \underline{k}x^n \qquad \Big| \; k : \text{a const}$$

$$\int dy = \int k x^n \, dx$$

$$y = k \int x^n \, dx$$

$$= k \frac{x^{n+1}}{n+1} + C ?$$

$$\frac{dy}{dx} = e^x$$

$$dy = e^x dx$$

$$\int dy = \int e^x dx$$

$$y = \int e^x dx$$

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$$y = \int e^x \, dx$$

$$= \int \left[1 + x + \frac{x^2}{2} + \frac{x^3}{6} + \cdots \right] dx$$

$$= \int dx + \int x \, dx + \int \frac{x^2}{2} dx + \int \frac{x^3}{6} dx$$

$$y = x + \frac{x^2}{2} + \frac{x^3}{6} + \frac{x^4}{24} + \cdots$$

$+$ constant :

$$y = 1 + x + \frac{x^2}{2} + \frac{x^3}{6} + \cdots + K = e^x + K$$

$$\int e^x dx = e^x + k$$

$$y = \int \cos(x)$$

$$\cancel{= \int x}$$

$$= \int \left[1 - \frac{x^2}{2} + \frac{x^4}{4 \cdot 3 \cdot 2 \cdot 1} - \frac{x^6}{6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} \right]$$

$$= x - \frac{x^3}{6} + \frac{x^5}{5!} - \frac{x^7}{7!} + \cdots + C$$

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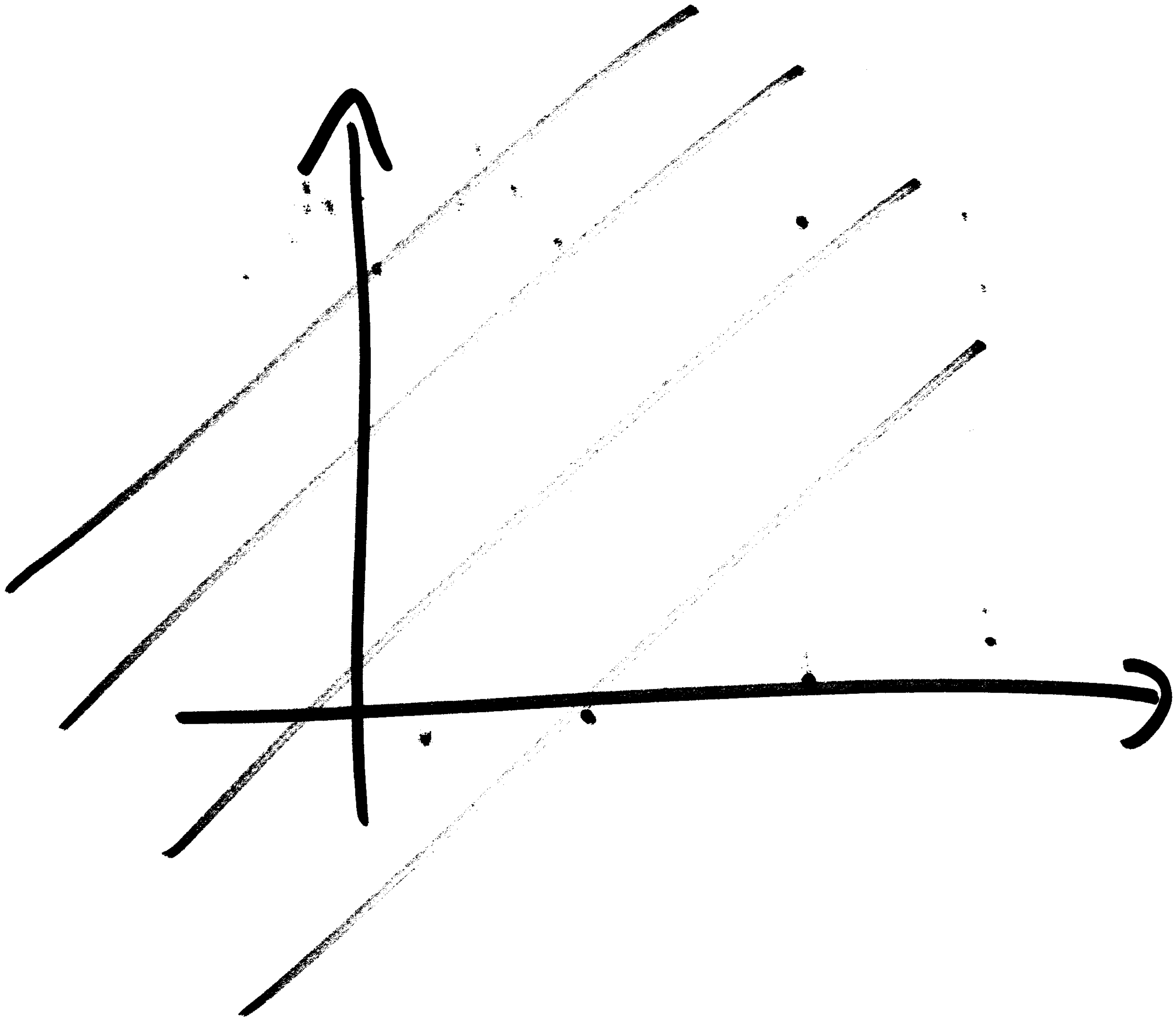
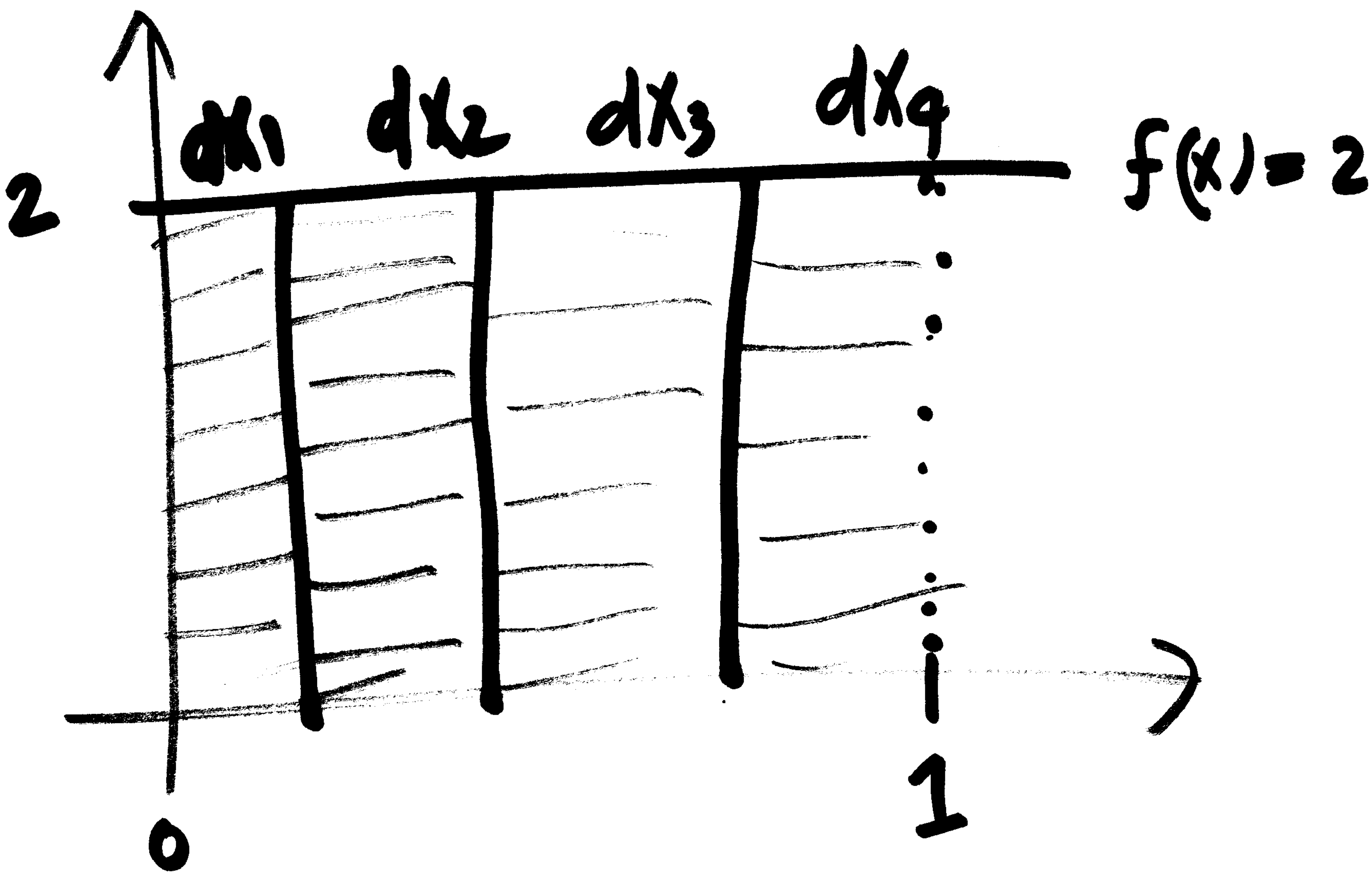
$$\frac{dy}{dx} = \cos(x)$$

$$y = \sin(x) + c$$

$$\frac{dy}{dx} = \sin x$$

$$y = -\cos x + \text{Const.}$$




dx1
dx2
dx3
dx4
f(x) = 2
2
0
1

$$\int f(x)\,dx = dx_1 f(x_1) + dx_2 f(x_2) + dx_3 \cdot f(x_3) + dx_4 \cdot f(x_4)$$

$$\int f(x)\,dx = \overset{2}{\overline{f(x_1)}}\,dx_1 + f(x_2)\,dx_2 + f(x_3)\,dx_3 + f(x_4)\,dx_4$$

$$\int_a^b \frac{dy}{dx} = y(x=b) - y(a)$$

Defenite integral

$$\int_a^b f'(x) = \int_a^b \frac{df}{dx} = f\Big|_a^b$$

$$= f(x=b) - f(x=a)$$

$\cancel{dy}$ $$\frac{dy}{dx} = x$$

$$\int_0^2 dy = \int_0^2 x\,dx$$

$$= \frac{x^2}{2}\Big|_0^2 = \frac{2^2}{2} - \frac{0^2}{2}$$

$$= \underline{2}$$

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