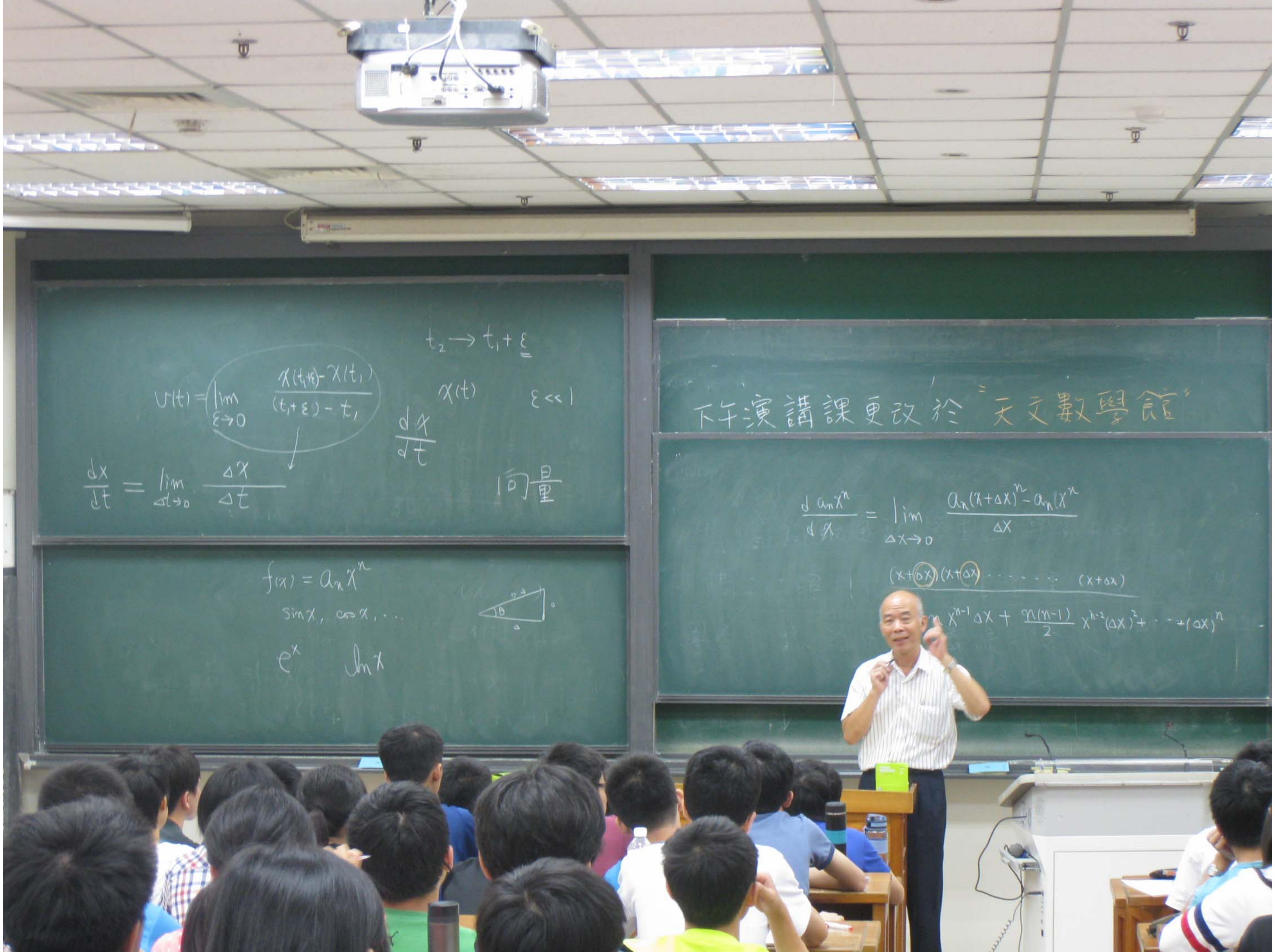


下午演講課更改於"天文數學館"
向量
sin x, cos x, ...
e^x   ln x

$$t_2 \longrightarrow t_1 + \varepsilon$$

$$v(t) = \lim_{\varepsilon \to 0} \frac{x(t_1+\varepsilon) - x(t_1)}{(t_1+\varepsilon) - t_1}$$

$x(t)$

$\varepsilon \ll 1$

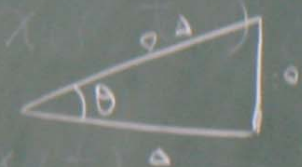
$$\frac{dx}{dt}$$

$$\frac{dx}{dt} = \lim_{\Delta t \to 0} \frac{\Delta x}{\Delta t}$$

向量

$$f(x) = a_n x^n$$

$\sin x$, $\cos x$, . . .



e^x $\ln x$

$$\frac{d\, a_n x^n}{dx} = \lim_{\Delta x \to 0} \frac{a_n (x+\Delta x)^n - a_n x^n}{\Delta x}$$

$$(x+\Delta x)(x+\Delta x) \cdots\cdots (x+\Delta x)$$

$$x^n + n x^{n-1} \Delta x + \frac{n(n-1)}{2} x^{n-2} (\Delta x)^2 + \cdots + (\Delta x)^n$$

$$= \lim_{\Delta x \to 0} \frac{n x^{n-1} \Delta x}{\Delta x} = n x^{n-1}$$

$$\frac{d\, a_n x^n}{dx} = \lim_{\Delta x \to 0} \frac{a_n (x+\Delta x)^n - a_n x^n}{\Delta x} = a_n n x^{n-1}$$

$$\frac{(x+\Delta x)(x+\Delta x) \cdots (x+\Delta x)}{}$$

$$x^n + n x^{n-1} \Delta x + \frac{n(n-1)}{2} x^{n-2} (\Delta x)^2 + \cdots + (\Delta x)^n$$

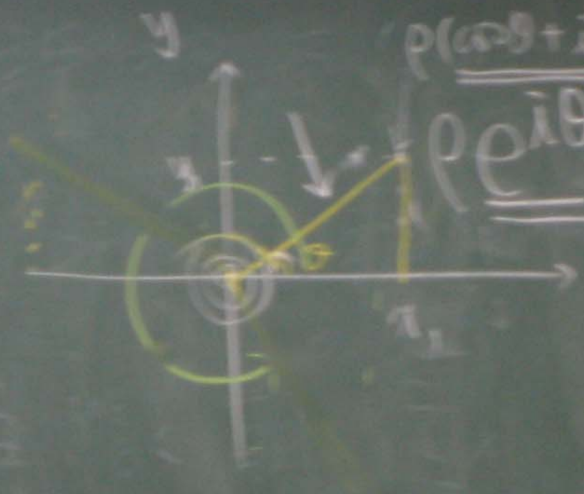
$$= \lim_{\Delta x \to 0} \frac{n x^{n-1} \Delta x}{\Delta x} = a_n n x^{n-1}$$

$$\cos\theta \equiv \frac{x_1}{\sqrt{x_1^2 + y_1^2}}$$

$$\sin\theta \equiv \frac{y_1}{\sqrt{x_1^2 + y_1^2}}$$

$$\cos\theta \equiv \frac{x_1}{\sqrt{x_1^2+y_1^2}}$$

$$\sin\theta \equiv \frac{y_1}{\sqrt{x_1^2+y_1^2}}$$



$\rho(\cos\theta + i\sin\theta)$

$\rho e^{i\theta}$

$(\rho\cos\theta, \rho\sin\theta)$

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

$$\frac{d\cos\theta}{d\theta} = \lim_{\Delta\theta\to 0} \frac{\cos(\theta+\Delta\theta) - \cos\theta}{\Delta\theta} = \lim_{\Delta\theta\to 0}$$

$-\sin\theta$

$$\frac{d\sin\theta}{d\theta} = \cos\theta$$

$= -\sin\theta$