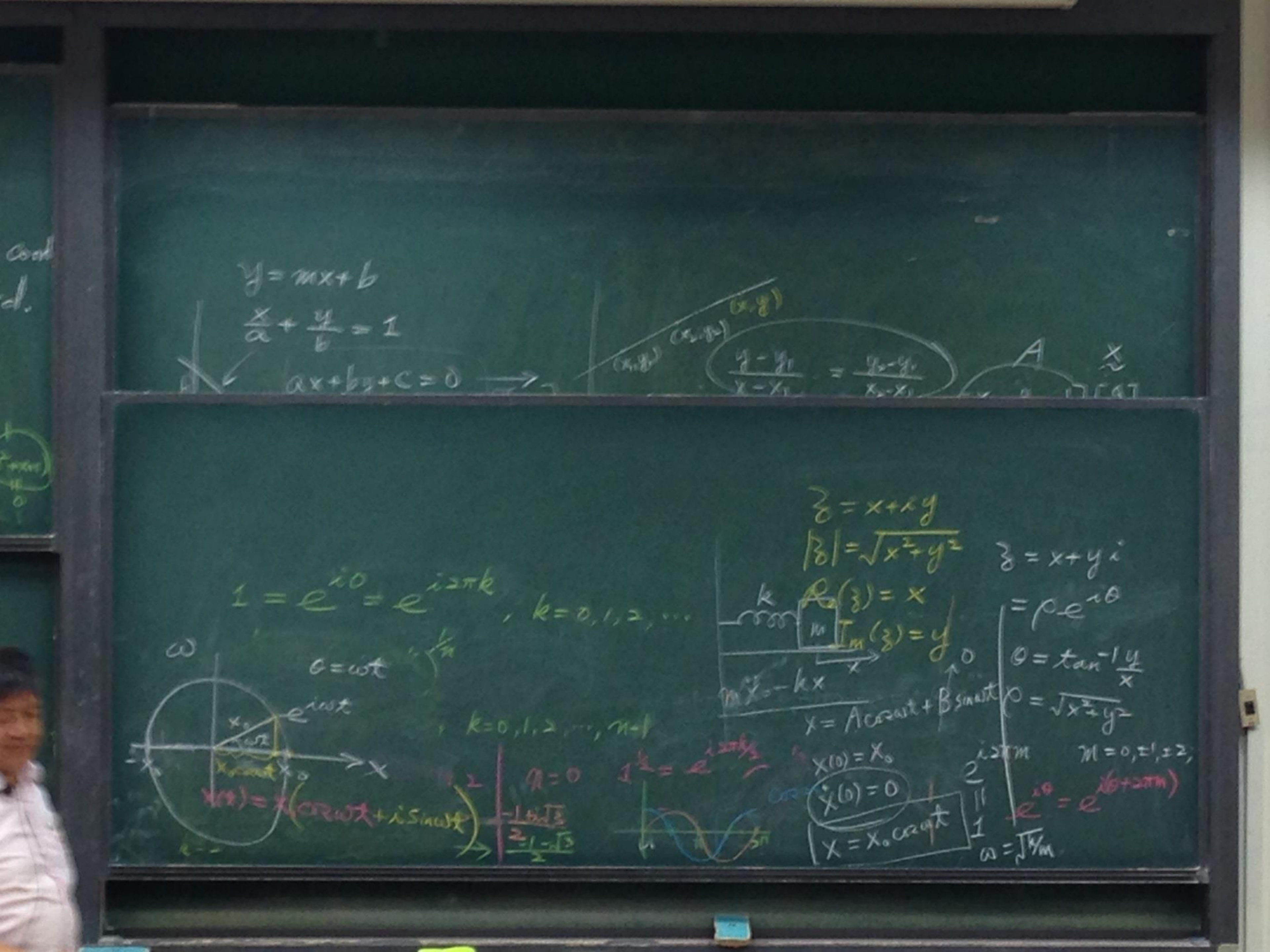
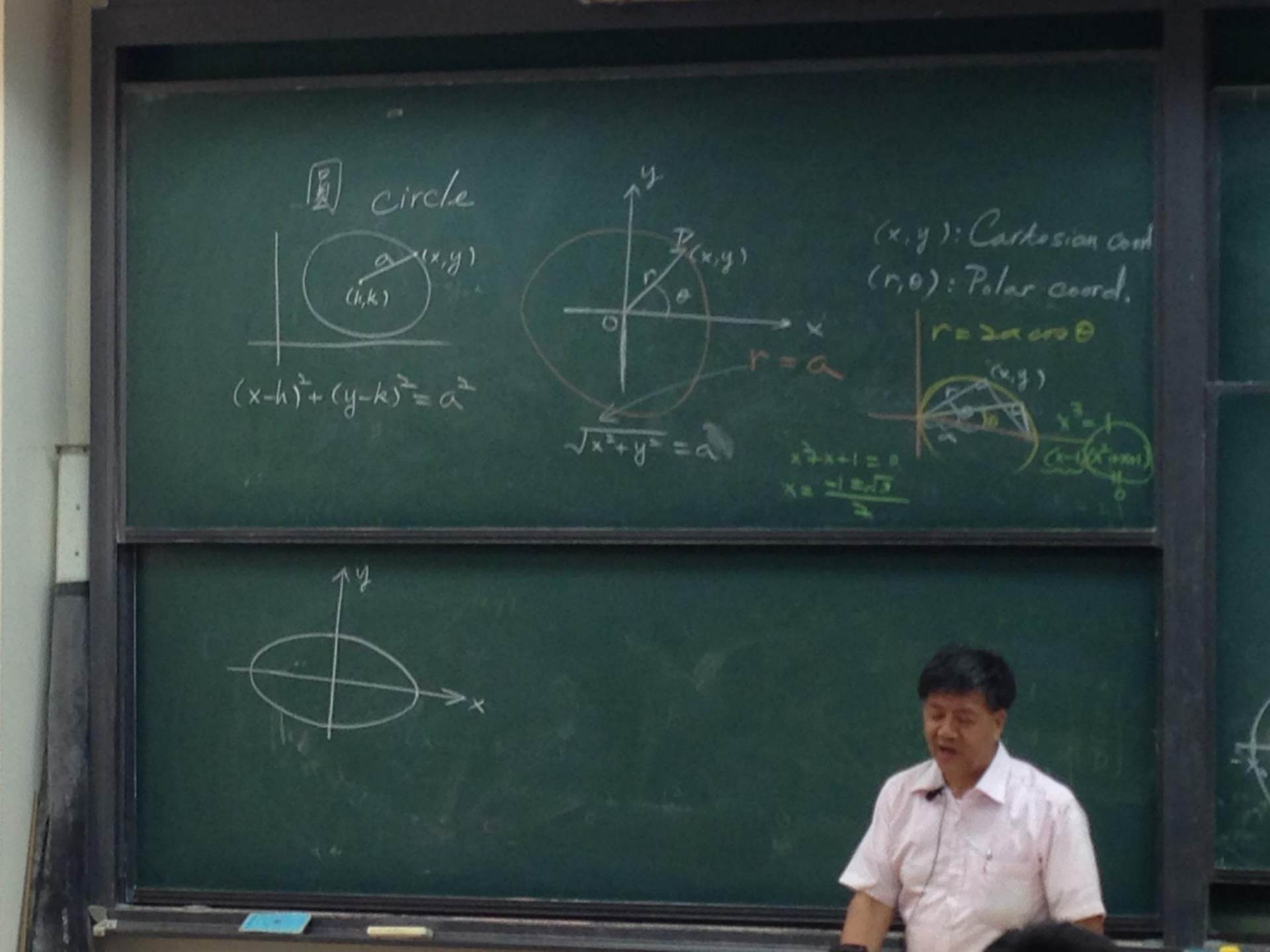


y = mx + b
x/a + y/b = 1
ax + by + c = 0
(x, y)
(x2, y2)
(x1, y1)
z = x + iy
|z| = √(x² + y²)
Re(z) = x
Im(z) = y
z = x + yi
= ρe^{iθ}
θ = tan^{-1} y/x
ρ = √(x² + y²)
1 = e^{i0} = e^{i2πk}, k = 0, 1, 2, ...
θ = ωt
e^{iωt}
k = 0, 1, 2, ..., n-1
n = 0, ±1, ±2
e^{iθ} = e^{i(θ+2πn)}
mẍ = -kx
x = A cos ωt + B sin ωt
x(0) = x0
ẋ(0) = 0
x = x0 cos ωt
ω = √(k/m)
x(t) = x0(cos ωt + i sin ωt)


圓 circle
a
(x,y)
(h,k)
$(x-h)^2+(y-k)^2=a^2$
y
P(x,y)
r
θ
O
x
r = a
$\sqrt{x^2+y^2}=a$
(x,y): Cartesian coord.
(r,θ): Polar coord.
$r=2a\cos\theta$
(x,y)
x^3-1
$x^2+x+1=0$
$x=\frac{-1\pm\sqrt{3}i}{2}$
y
x

$$1 = e^{i0} = e^{i2\pi k}, \quad k = 0, 1, 2, \ldots$$

ω

$\theta = \omega t$

$e^{i\omega t}$

x_0

ωt

$-x_0$ x_0 x

$x_0 \cos\omega t$

$x(t) = x_0(\cos\omega t + i\sin\omega t)$

60°

$k = 0, 1, 2, \cdots, n-1$

$1^{\frac{1}{n}} = e^{i2\pi k/n}$

n	
1	1
2	-1
3	$\frac{-1+i\sqrt{3}}{2}$, $\frac{-1-i\sqrt{3}}{2}$

$\cos$

0 π 2π

$z = x + iy$

$|z| = \sqrt{x^2+y^2}$

$z = x + yi$

$= \rho e^{i\theta}$

$\theta = \tan^{-1}\frac{y}{x}$

$\rho = \sqrt{x^2+y^2}$

k m $R_e(z) = x$ $I_m(z) = y$

x 0

$m\ddot{x} = -kx$

$x = A\cos\omega t + B\sin\omega t$

$x(0) = x_0$

$\dot{x}(0) = 0$

$x = x_0\cos\omega t$

$e^{i2\pi m} = 1$

$e^{i\theta} = e^{i(\theta+2\pi m)}$

$m = 0, \pm1, \pm2, \ldots$

$\omega = \sqrt{k/m}$.

$y^2 = 4ax$

$y = mx + b$

$x = 4ay$

$\frac{x}{a} + \frac{y}{b} = 1$

$ax + by + c = 0$

b a

$\det(A) \equiv |A| \quad A\underset{\sim}{x} = \underset{\sim}{b}$

$\neq 0$

假設 A^{-1} 存在，

Conic Sections

Directrix 準線

y

$P(x,y)$ Q

r θ

Focus 焦點 F_1

q

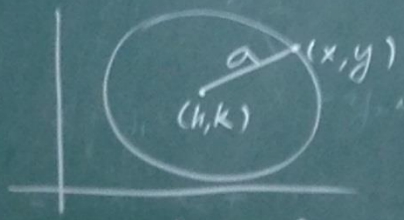
$\frac{PF_1}{PQ} = \epsilon =$ 離心率 eccentricity

$\sqrt{(x-c)^2+y^2} = \epsilon(q - r\cos\theta)$

r

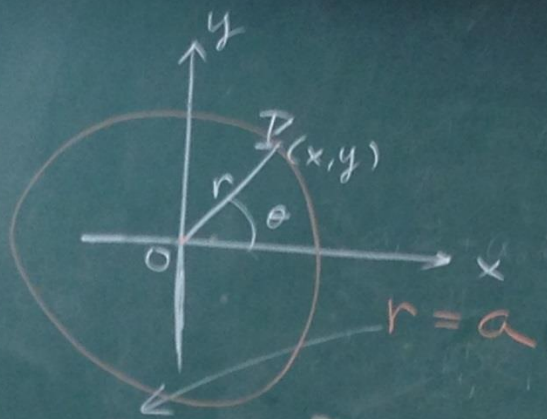
$r = \frac{\epsilon q}{1 + \epsilon\cos\theta}$

圓 circle



$$\frac{x^2}{16}+\frac{y^2}{9}=1$$

$$y=\pm 3\sqrt{1-\frac{x^2}{16}}$$



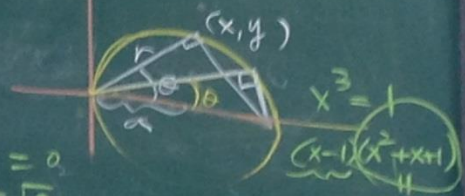
$r=a$

$$\sqrt{x^2+y^2}=a$$

(x,y): Cartesian coord.

(r,θ): Polar coord.

$r=2a\cos\theta$



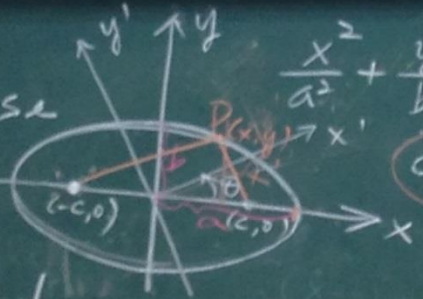
$x^3=1$

$(x-1)(x^2+x+1)=0$

$x^2+x+1=0$

$x=\frac{-1\pm\sqrt{3}}{2}$

ellipse 橢圓



$$\frac{x^2}{a^2}+\frac{y^2}{b^2}=1 \quad (a>b)$$

$$c=\sqrt{a^2-b^2}$$

$$\epsilon\equiv \frac{c}{a}=\text{eccentricity}$$

$$\sqrt{(x-c)^2+y^2}+\sqrt{(x+c)^2+y^2}=2a$$

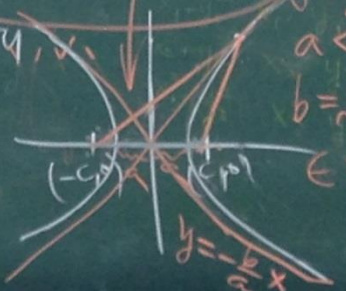
hyperbola 双曲線

$$\sqrt{(x+c)^2+y^2}-\sqrt{(x-c)^2+y^2}=\pm 2a$$

$$\epsilon=\frac{c}{a}=\frac{\sqrt{a^2+b^2}}{a}<1$$

$$\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$$

$$\sinh x=\frac{x}{1!}-\frac{x^3}{3!}+\frac{x^5}{5!}$$



$y=-\frac{b}{a}x$

$a<c$

$b=\sqrt{c^2-a^2}$

$\epsilon=\frac{c}{a}>1.$

$y=\frac{b}{a}x$