

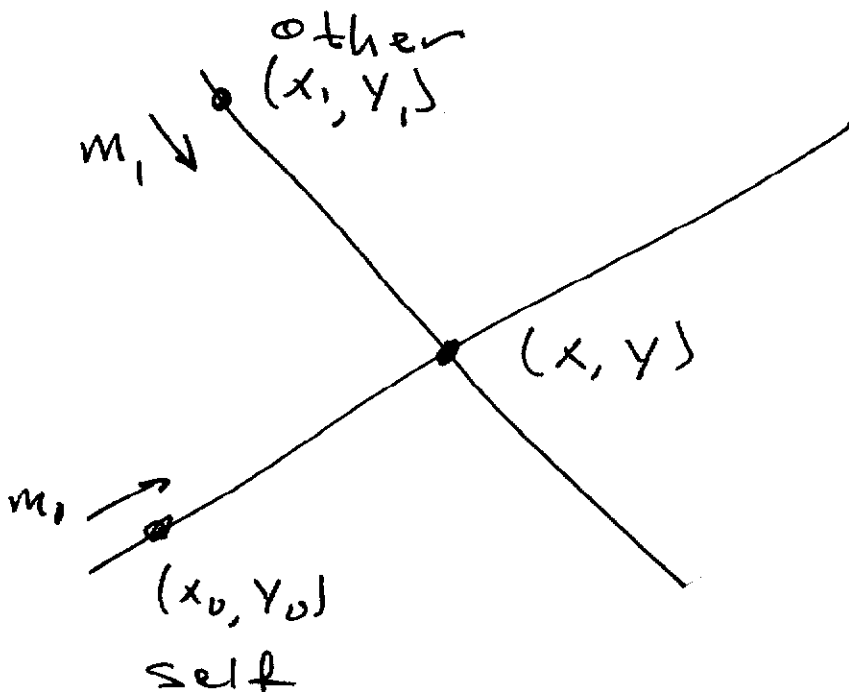
CSE 30 4-22-21

L1

- quiz soln. Posted
- Pa3: ext. 2 days to Sunday
- lab2: ext 1 day to Tuesday

Pa3 questions:

intersect()



Point slope form

$$\begin{cases} y - y_0 = m_0(x - x_0) & \text{self} \\ y - y_1 = m_1(x - x_1) & \text{other} \end{cases}$$

$$\begin{cases} y = \overbrace{(y_0 - m_0 x_0)}^a + m_0 x \\ y = \underbrace{(y_1 - m_1 x_1)}_b + m_1 x \end{cases}$$

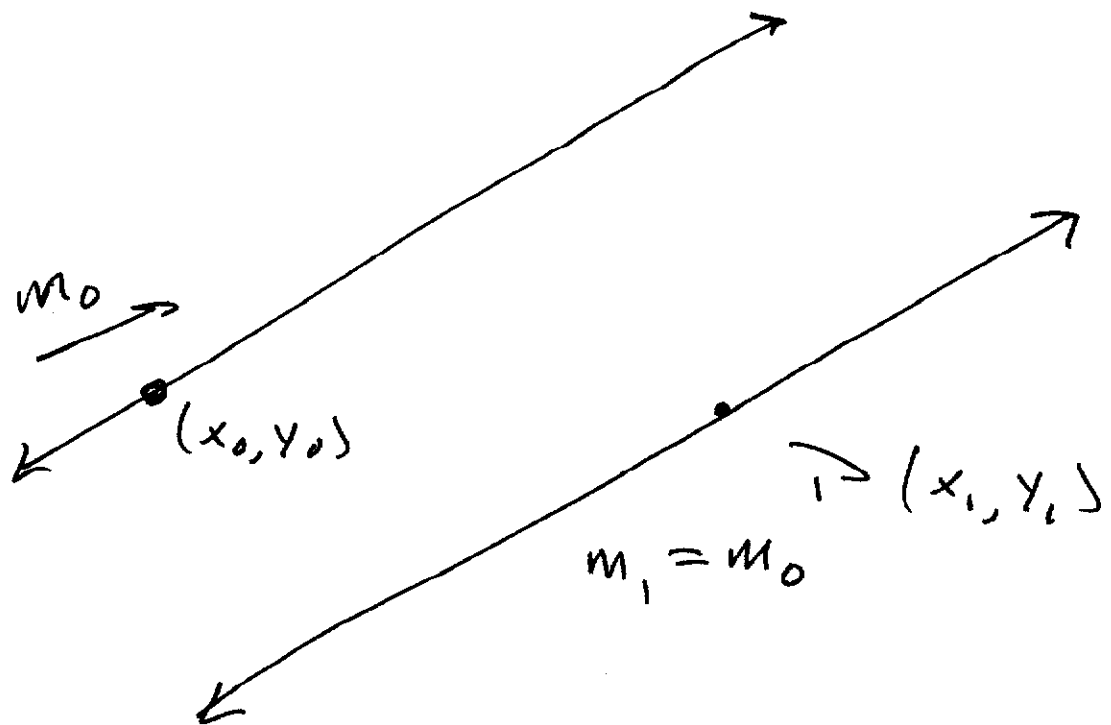
$$\begin{cases} y = a + m_0 x \\ y = b + m_1 x \end{cases}$$

$$a + m_0 x = b + m_1 x$$

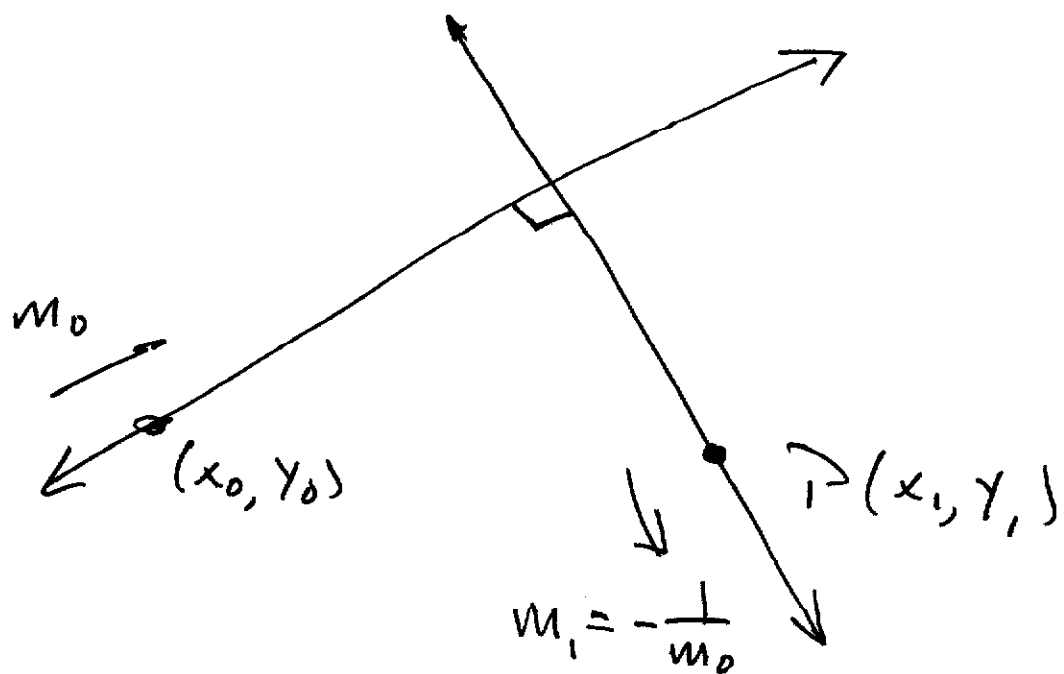
$$(m_0 - m_1)x = b - a$$

$$x = \frac{b - a}{m_0 - m_1}$$

Parallel_line()

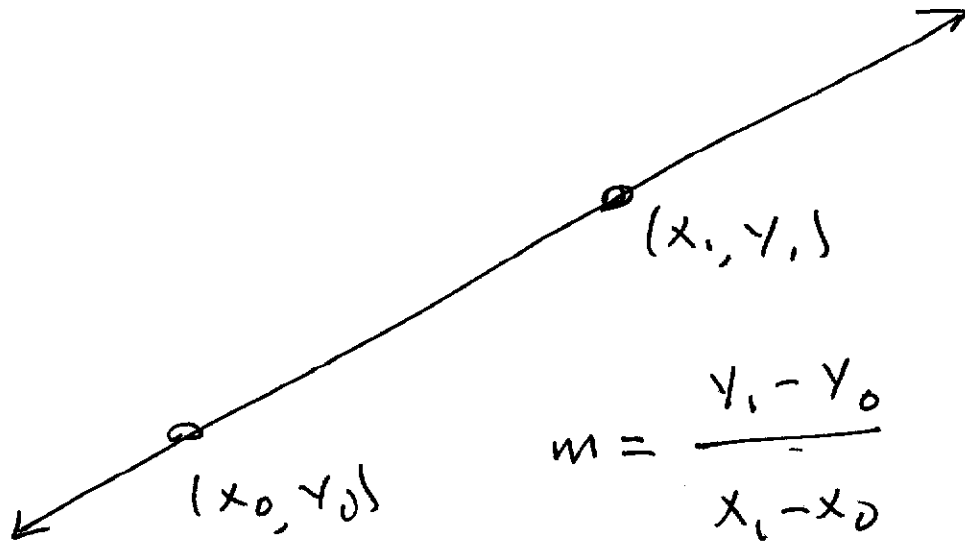


Perpendicular_line()



in Point class

join()



Complex class

what is a complex number?

imaginary unit: $i^2 = -1$

mathematicians: i complex class

electrical engs: j ← built-in complex class

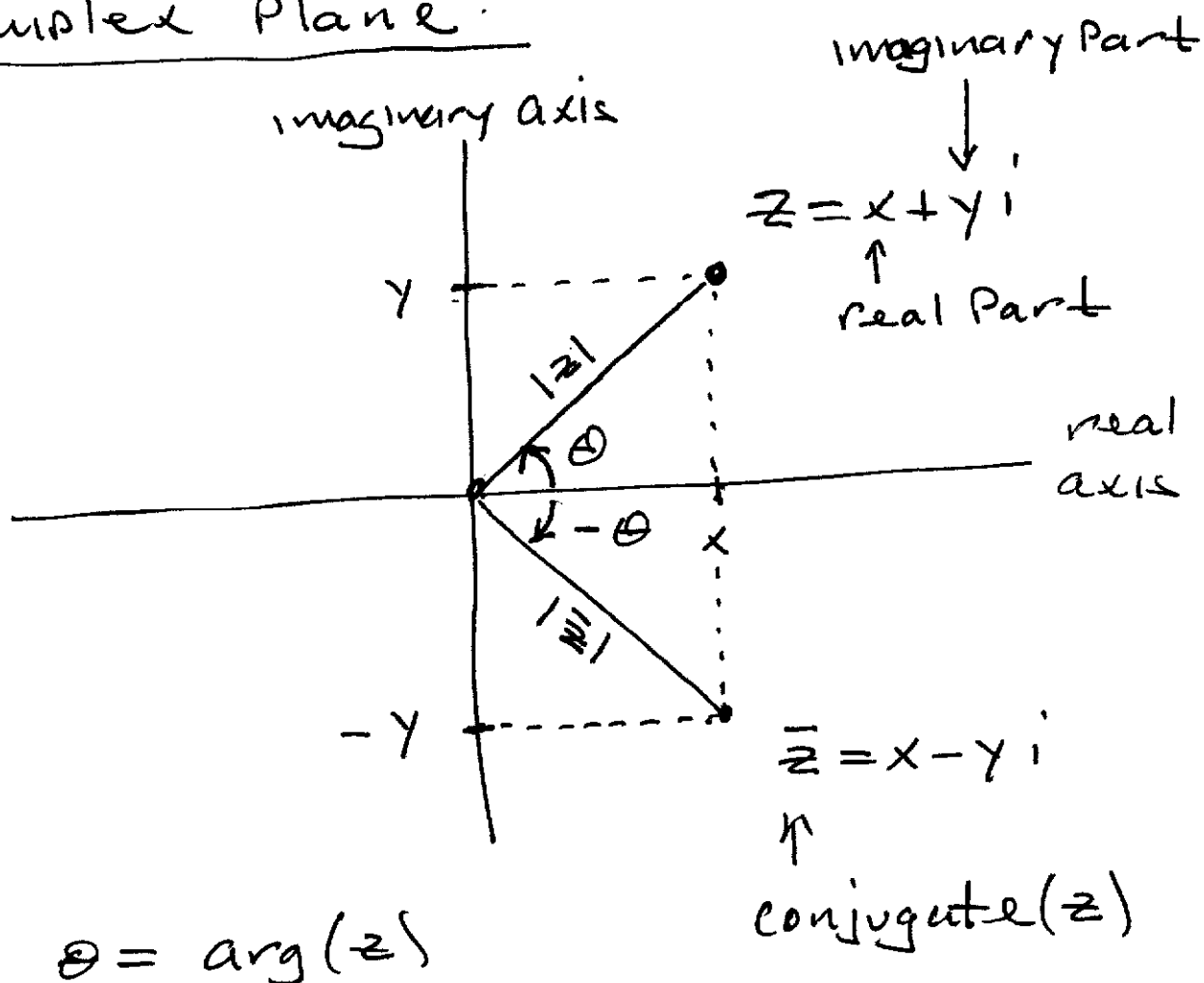
a complex number is an expression of the form

$$z = x + yi$$

where $x, y \in \mathbb{R}$

↑
set of real numbers.

Complex Plane



Complex arithmetic

$$(x + yi) + (u + vi) = (x + u) + (y + v)i$$

$$(x + yi) - (u + vi) = (x - u) + (y - v)i$$

$$(x+yi)(u+vi)$$

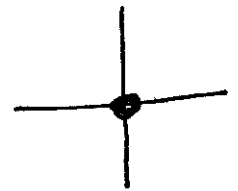
$$= xu + yiu + xvi + yivi$$

$$= xu + yui + xvi + yv i^2$$

$$= xu + (yu + xv)i - yv$$

$$= (xu - yv) + (yu + xv)i$$

complex zero = $0 + 0i$



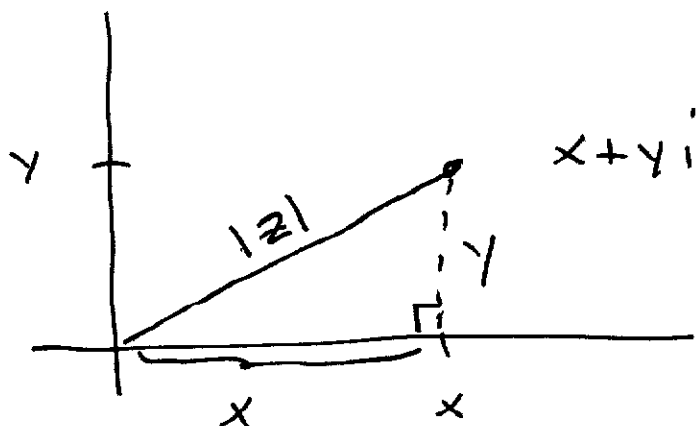
let $z = x + iy$, $\bar{z} = x - iy$

$$z\bar{z} = (x+yi)(x-yi)$$

$$= x^2 + x\cancel{y}i - x\cancel{y}i + y^2$$

$$= x^2 + y^2$$

$$= |z|^2 = |z| \cdot |\bar{z}|$$



$$x^2 + y^2 = |z|^2$$

$$\frac{1}{z} = \frac{\bar{z}}{z \cdot \bar{z}} = \frac{x - yi}{x^2 + y^2}$$

Thus

$$\frac{1}{x + yi} = \left(\frac{x}{x^2 + y^2} \right) + \left(\frac{-y}{x^2 + y^2} \right) i$$

$$\frac{z}{w} = \frac{z \bar{w}}{w \bar{w}} = \frac{z \bar{w}}{|w|^2}$$

$$z = x + yi$$

$$w = u + vi$$

$$\bar{w} = u - vi$$

$$z \bar{w} = (x + yi)(u - vi)$$

$$= (xu + yv) + (yu - xv)i$$

$$\frac{z}{w} = \left(\frac{xu + yv}{u^2 + v^2} \right) + \left(\frac{yu - xv}{u^2 + v^2} \right)i$$

@property decorator:

allows user to call a fun (with no arguments) without parentheses.

$z = \text{complex}(2, 3) \# z + 3i$

$z.\text{real}() \# 2$

$z.\text{imag}() \# 3$

can also do:

$z.\text{real} \# 2$

$z.\text{imag} \# 3$

move on Property objects later.

overloading operators!

+ : `--add--()`

- : `--sub--()`

* : `--mul--()`

/ : `--truediv--()`

// : `--floordiv--()`

% : `--mod--()`

:

<

<=

>=

>

==

!=

...