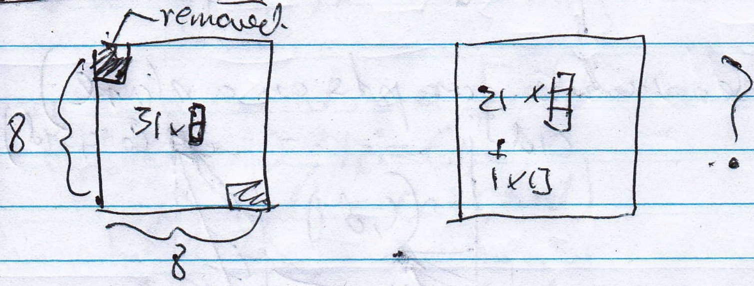
OFFICE HRS. WED 3-4PM THIS WEEK & NEXT

READ ALONG: SEC 1.1 - 1.4 of text.

SEPT 22/14

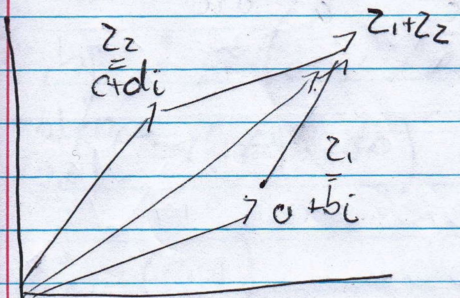
MAT 240 LECTURE 5

RIDDLE ALONG:



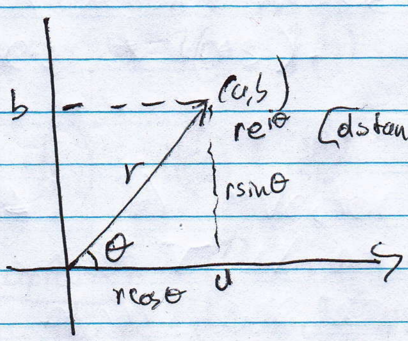
$\mathbb{C} = \{(a,b) : a, b \in \mathbb{R}\}$, $i = (0,1)$ $\therefore (a,b) \Longleftrightarrow a+bi$

1. $(a+bi) + (c+di) = (a+c) + (b+d)i$



"Parallelogram Law"

Polar Coordinates



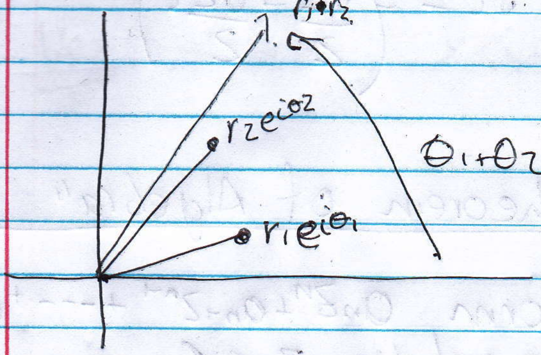
(distance from origin r, angle is θ)

ie $re^{i\theta} = r\cos\theta + ir\sin\theta$
$= r(\cos\theta + i\sin\theta)$

$z.\ (a+bi)(c+di) = (ac-bd) + (ad+bc)i$

Claim: $r_1 e^{i\theta_1} \times r_2 e^{i\theta_2} = r_1 r_2 e^{i(\theta_1+\theta_2)}$

So



Proof of Claim:

$r_1 e^{i\theta_1} \times r_2 e^{i\theta_2} \overset{\text{by defn}}{=} r_1(\cos\theta_1 + i\sin\theta_1) * r_2(\cos\theta_2 + i\sin\theta_2)$ using multiplication of complex #s

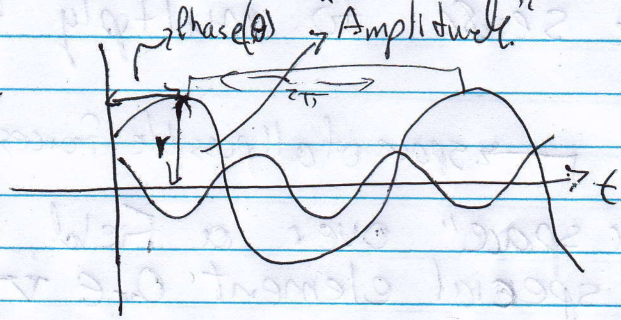
$= r_1 \cdot r_2\big((\cos\theta_1\cos\theta_2 - \sin\theta_1\sin\theta_2) + ((\cos\theta_1\sin\theta_2 + \sin\theta_1\cos\theta_2)i)\big)$

$\overset{\text{by trig}}{=} r_1 r_2\big(\cos(\theta_1+\theta_2) + i\sin(\theta_1+\theta_2)\big)$

$= (r_1 r_2)(e^{i(\theta_1+\theta_2)})$

Side: relevance $\mathbb{C}$

Waves



To describe a wave w/ given frequency you need $r, \theta \rightsquigarrow r \cdot e^{i\theta}$

Ohm's Law = $V = R \cdot I$

over $\mathbb{C}$ when dealing w/ AC.