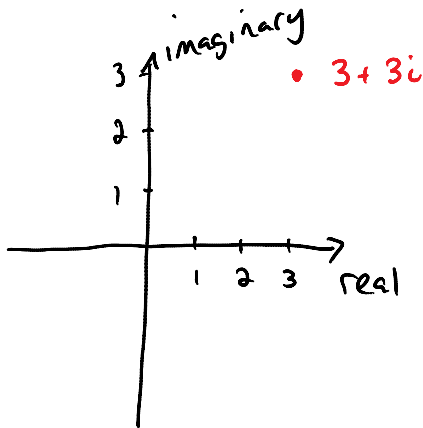


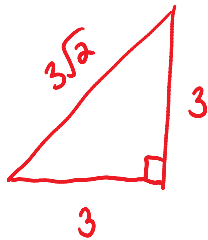
## Section 8.3: Complex Numbers in Trig Form

Thursday, March 05, 2015  
11:55 AM

Graph the complex number  $3+3i$  in the complex plane.

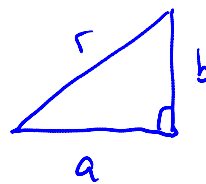


What is the distance from the origin to this point?



in general:

$a+bi$  - complex number



$$r = \sqrt{a^2 + b^2}$$

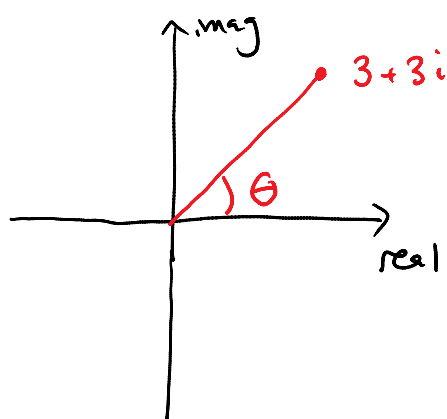
So, what is the absolute value of a complex number?

→ the distance from the origin

$$|3+3i| = 3\sqrt{2}$$

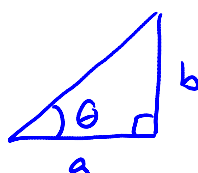
$$|a+bi| = \sqrt{a^2 + b^2}$$

What angle does this line make with the x-axis in standard position?



$$\theta = 45^\circ$$

general case:  
 $a+bi$



$$\tan \theta = \frac{b}{a}$$

(note:  $\theta = \tan^{-1}\left(\frac{b}{a}\right)$  is

only true if  $\theta$  is in  
QI or IV, but look  
at diagram in  
that case)

you'll notice that there are now two ways to specify a complex number:

①  $a + bi$  (rectangular form)

② give  $r$  and  $\theta$  (polar form)

where  $r$  = distance from origin

$\theta$  = angle that the line  $r$  makes  
in standard position

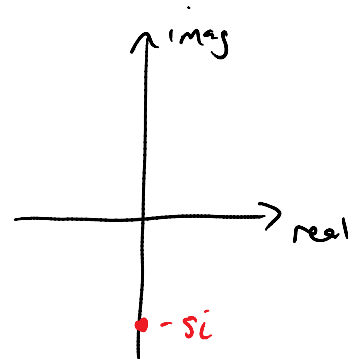
find  $r$  and  $\theta$  for the following complex numbers:

a)  $-5i$

$$r = 5$$

$$\theta = 270^\circ \text{ or } -90^\circ \text{ or coterminal}$$

$$= \frac{3\pi}{2} \text{ or } -\frac{\pi}{2} \text{ or coterminal}$$



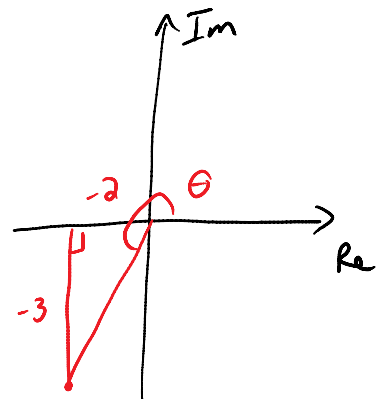
b)  $-2 - 3i$  (round to one decimal place)

$$r = \sqrt{(-2)^2 + (-3)^2}$$

$$= \sqrt{13}$$

$$\approx 3.60555$$

$$\approx 3.6$$



$$\tan \theta = \frac{b}{a} = \frac{-3}{-2}$$

$$\text{and } \tan^{-1}\left(\frac{3}{2}\right) = 56.3^\circ$$

$$\theta = 236.3^\circ \\ \text{or } -123.7^\circ \\ \text{or coterminal}$$