Name _Key_____ Date _____

Directions: Convert each complex number to the form $r(\cos(\theta) + i\sin(\theta))$

1) $1 + i\sqrt{3}$

Draw a graph. Pythag triple;
Mag 2, Arg pi/3.

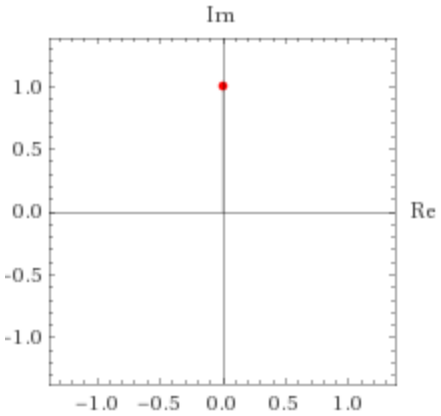
$2(\cos\left(\frac{\pi}{3}\right) + i\sin(\frac{\pi}{3}))$

2) $4 - 3i$

Draw a graph. Another pythag triple;
Mag 5. Arg isn't easily calculable; just use the formula: arctan(-3/4).

$5(\cos(\arctan(-3/4)) + i\sin(\arctan(-3/4)))$

3)



Easy. Magnitude 1, argument pi/2.

$\cos\left(\frac{\pi}{2}\right) + i\sin(\frac{\pi}{2})$

4) $\sin\left(\frac{\pi}{3}\right) + i\cos(\frac{\pi}{3})$

Draw a graph. This isn't already in polar form. You can convert to standard to get $\frac{\sqrt{3}}{2} + \frac{i}{2}$, then plot that to get an easy triangle. Mag 1, arg pi/6.

$\cos\left(\frac{\pi}{6}\right) + i\sin(\frac{\pi}{6})$

Challenge Problems

Directions: These are optional bonus problems you may attempt if you desire.

C1) Suppose you have the function $z = t(\cos t + i\sin t)$. What would this function look like on the complex plane as t goes to infinity? What if t goes to negative infinity? Do these two graphs (as t goes to positive or negative infinity) intersect, and if so, where?

The graphs look like this, with t-> positive infinity rotating in the CCW direction and t-> negative infinity rotating in the CW direction. The graphs intersect every pi/2+pi*k radians, so their intersections are: $I = (-1)^k i * \left(\frac{\pi}{2} + \pi k\right), k \in \mathbb{N}$. The graph is on the next page.

Parametric plot: