

Euler's Formula

MA 6 Problems

Due Wednesday, April 22

Recall that Euler's formula is given by

$$e^{i\theta} = \cos \theta + i \sin \theta.$$

1. In the following problems you are given a complex number. Using Euler's formula, write this number as $e^{i\theta}$ for an appropriate angle θ . For example, given the number $1 + 0i$, you should sketch the unit circle, show that this number corresponds to the point $(1, 0)$ which has angle 0, and thus you get e^{i0} .

(a) $\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}i$

(b) $-\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}i$

(c) $\frac{\sqrt{2}}{2} - \frac{\sqrt{2}}{2}i$

(d) $-\frac{\sqrt{2}}{2} - \frac{\sqrt{2}}{2}i$

(e) $-\frac{\sqrt{3}}{2} + \frac{1}{2}i$

(f) -1

(g) $-i$

2. For the following problems you should do the opposite – given an angle, determine the corresponding complex number.

(a) $\theta = \frac{\pi}{3}$

(b) $\theta = \frac{\pi}{6}$

(c) $\theta = \pi$

(d) $\theta = -60^\circ$

(e) $\theta = 120^\circ$

(f) $\theta = 2\pi$

(g) $\theta = 270^\circ$

(h) $\theta = \frac{5\pi}{4}$