

## MATH 19 QUIZ 06 OCTOBER 2016 BROWN UNIVERSITY INSTRUCTOR: SAMUEL S. WATSON

1. Find all solutions of the equation  $z^3 = 8$ . Express your answers in the form a + bi where a and b are real numbers.

$$z^{3}=8 \iff r^{3}ais(30)=8$$
, where  $z=rai0$   
Then  $r^{3}ais(30)=8ais(0) \implies r=2$  and  $30=360^{\circ}k$   
for some  $k \in \mathbb{Z}$ . So we get  
 $2ais 0 = 2$   
 $2ais 120^{\circ} = -1 + \sqrt{3}i$   
 $2ais 240^{\circ} = -1 - \sqrt{3}i$ .

2. Show that if z is outside the unit circle, then  $z^{11}$  is also outside the unit circle.

$$\Rightarrow z = r \text{ cis} 0 \text{ for } r > 1$$

$$\Rightarrow z^{11} = r^{11} \text{ cis} 110$$

$$\Rightarrow |z| = r^{11} > 1$$

$$\Rightarrow z^{11} \text{ outside unit aide.}$$