

# Polar $\mathbb{C}$ WS

Name:

Example 1: Convert  $3+4i$  into polar form:

- Step 1: find the radius  $= \sqrt{3^2 + 4^2} = 5$
- Step 2: find the angle  $= \tan^{-1} \frac{4}{3} \approx 53^\circ$
- Put it all together:  
 $3 + 4i = 5(\cos 53 + i \sin 53)$   
 or  
 $3 + 4i = 5e^{53^\circ i}$

8. Find the rectangular form of  $4e^{3\pi/4}$ —aka  $4(\cos \frac{3\pi}{4} + i \sin \frac{3\pi}{4})$

9.  $2e^{\pi/3}$  —aka  $2(\cos \frac{\pi}{3} + i \sin \frac{\pi}{3})$

Example 2 Convert  $4e^{\pi/4}$  —aka  $4(\cos \frac{\pi}{4} + i \sin \frac{\pi}{4})$  into rectangular form.

- Step 1: find  $x = 4 \cos \frac{\pi}{4} = 2\sqrt{2}$
- Step 2: find  $y = 4 \sin \frac{\pi}{4} = 2\sqrt{2}$
- Put it together:  $4e^{\pi/4} = 2\sqrt{2} + 2\sqrt{2}i$

10.  $6e^{\pi/6}$ —aka  $6(\cos \frac{\pi}{6} + i \sin \frac{\pi}{6})$

1. Find the polar form of  $3\sqrt{3} + 3i$

11.  $2e^{4\pi/3}$  —aka  $2(\cos \frac{4\pi}{3} + i \sin \frac{4\pi}{3})$

2. Find the polar form of  $6\sqrt{3} + 6i$

3. Find the polar form of  $2 + 2\sqrt{3}i$

12.  $13e^{67.3^\circ}$  —aka  $13(\cos 67.3 + i \sin 67.3)$

4. Find the polar form of  $5 + 5i$

5. Find the polar form of  $4 - 3i$

6. Find the polar form of  $12 + 5i$

7. Find the polar form of  $8 - 6i$

## Answers

$3\sqrt{3} + 3i = 6(\cos \frac{\pi}{6} + i \sin \frac{\pi}{6}) = 6e^{i\pi/6}$   
 $6\sqrt{3} + 6i = 12(\cos \frac{\pi}{6} + i \sin \frac{\pi}{6}) = 12e^{i\pi/6}$   
 $2 + 2\sqrt{3}i = 4(\cos \frac{\pi}{6} + i \sin \frac{\pi}{6}) = 4e^{i\pi/6}$   
 $5 + 5i = 5\sqrt{2}(\cos \frac{\pi}{4} + i \sin \frac{\pi}{4}) = 5\sqrt{2}e^{i\pi/4}$   
 $4 - 3i = 5(\cos \theta + i \sin \theta)$   
 $12 + 5i = 13(\cos \theta + i \sin \theta)$   
 $8 - 6i = 10(\cos \theta + i \sin \theta)$