Pre-Calculus **HW#6.5-4** **Name:**

Write in polar form:

1. 3

$3 \text{ cis } 0$

2. $2\sqrt{2} - i$

$r = \sqrt{(2\sqrt{2})^2 + (-1)^2}$

$= 3$

$\tan\theta = \frac{-1}{2\sqrt{2}}$ $\quad 3 \text{ cis } (-19.5^\circ)$

$\theta = -19.5^\circ$

3. $-2i$

$2 \text{ cis } \frac{3\pi}{2}$

Write in rectangular form.

4. $\frac{3}{2} cis 300^\circ$

$a = \frac{3}{2}\cos 300^\circ = \frac{3}{2} \cdot \frac{1}{2} = \frac{3}{4}$

$b = \frac{3}{2}\sin 300^\circ = \frac{3}{2} \cdot \frac{-\sqrt{3}}{2} = -\frac{3\sqrt{3}}{4}$

$\frac{3}{4} - \frac{3\sqrt{3}}{4} i$

5. $8 cis \frac{5\pi}{6}$

$a = 8 \cdot \cos\frac{5\pi}{6} = 8 \cdot -\frac{\sqrt{3}}{2} = -4\sqrt{3}$

$b = 8 \cdot \sin\frac{5\pi}{6} = 8 \cdot \frac{1}{2} = 4$

$-4\sqrt{3} + 4i$

Perform the operations on #s 6-13. Write answers in rectangular form for #8-13.

6. $\frac{12 cis 52^\circ}{3 cis 110^\circ}$

$4 \text{ cis } (-58^\circ)$

7. $\frac{3}{2} cis \frac{\pi}{2} \cdot 6 cis \frac{\pi}{4}$

$9 \text{ cis } \frac{3\pi}{4}$

8. $(-1+i)^{10}$

$r = \sqrt{2} \quad \theta = \frac{3\pi}{4}$

$\left(\sqrt{2} \text{ cis } \frac{3\pi}{4}\right)^{10}$

$(\sqrt{2})^{10} \text{ cis } \left(\frac{3\pi}{4} \cdot 10\right)$

$32 \text{ cis } \frac{15\pi}{2}$

$32 \text{ cis } \frac{3\pi}{2} = -32i$

9. $4(1-\sqrt{3}i)^3$

$4 \left(2 \text{cis } \frac{5\pi}{3}\right)^3$

$4 \left(2^3 \text{ cis } \frac{5\pi}{3} \cdot 3\right)$

$4 \left(8 \text{ cis } 5\pi\right)$

$32 \text{ cis } 5\pi$

$32 \text{ cis } \pi = -32$

10. $[2 cis \frac{\pi}{2}]^8$

$2^8 \text{ cis } \frac{\pi}{2} \cdot 8$

$256 \text{ cis } 4\pi$

$256 \text{ cis } 0$

256

11. $3 cis \frac{\pi}{6} \cdot 2 cis \frac{5\pi}{3}$

$6 \text{ cis } \frac{11\pi}{6}$

$a = 6\cos\frac{11\pi}{6} = 6 \cdot \frac{\sqrt{3}}{2} = 3\sqrt{3}$

$b = 6\sin\frac{11\pi}{6} = 6 \cdot -\frac{1}{2} = -3$

$3\sqrt{3} - 3i$

12. Fourth roots of $16cis\frac{4\pi}{3}$

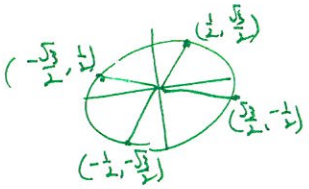
$\sqrt[4]{16}\ cis\left(\frac{\frac{4\pi}{3}+2\pi k}{4}\right)$

$k=0 \quad 2\ cis\ \frac{4\pi}{12} = 2\ cis\ \frac{\pi}{3}$

$k=1 \quad 2\ cis\ \frac{10\pi}{12} = 2\ cis\ \frac{5\pi}{6}$

$k=2 \quad 2\ cis\ \frac{16\pi}{12} = 2\ cis\ \frac{4\pi}{3}$

$k=3 \quad 2\ cis\ \frac{22\pi}{12} = 2\ cis\ \frac{11\pi}{6}$



$1+\sqrt{3}i$

$-\sqrt{3}+i$

$-1-\sqrt{3}i$

$\sqrt{3}-i$

13. Fourth roots of 4

$\sqrt[4]{4}\ cis\left(\frac{0+2\pi k}{4}\right)$

$k=0, \sqrt{2}\ cis\ 0$

$k=1, \sqrt{2}\ cis\ \frac{\pi}{2}$

$k=2 \quad \sqrt{2}\ cis\ \pi$

$k=3 \quad \sqrt{2}\ cis\ \frac{3\pi}{2}$

$\sqrt{2},\ \sqrt{2}i,\ -\sqrt{2},\ -\sqrt{2}i$

Solve. Find all solutions and represent them graphically on the complex plane. Leave answers in polar form.

14. $x^4-81=0$

$x^4 = 81$

$81\ cis\ 0$

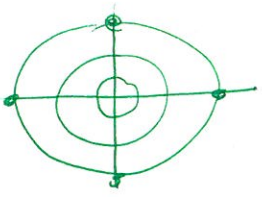
$\sqrt[4]{81}\ cis\ 0$

$\sqrt[4]{81}\ cis\left(\frac{0+2\pi}{4}\right) = \sqrt[4]{81}\ cis\ \frac{\pi}{2}$

$\sqrt[4]{81}\ cis\left(\frac{0+4\pi}{4}\right) = \sqrt[4]{81}\ cis\ \pi$

$\sqrt[4]{81}\ cis\left(\frac{0+6\pi}{4}\right) = \sqrt[4]{81}\ cis\ \frac{3\pi}{2}$

$3\ cis\ 0,\ 3\ cis\ \frac{\pi}{2},\ 3\ cis\ \pi,\ 3\ cis\ \frac{3\pi}{2}$



15. $x^5+243=0$

$x^5 = -243$

$243\ cis\ \pi$

$3\ cis\ \frac{\pi}{5}$

$3\ cis\ \frac{3\pi}{5}$

$3\ cis\ \frac{5\pi}{5}$

$3\ cis\ \frac{7\pi}{5}$

$3\ cis\ \frac{9\pi}{5}$