

Graph each number on the complex plane. Find the polar form of each number.

1.  $4 + 4i$

2.  $-1 + \sqrt{3}i$

3.  $-1 - 2i$

4.  $-1 + 0i$

5.  $0 + i$

6.  $0 - i$

Find the rectangular form for the following complex numbers (Express each number in the form of  $a + bi$ )

7.  $\frac{1}{2} \left( \cos \frac{\pi}{3} + i \sin \frac{\pi}{3} \right)$

8.  $8cis\pi$

9.  $4cis \frac{11\pi}{6}$

10.  $cis \left( \frac{-\pi}{2} \right)$

Find  $z_1 \cdot z_2$  and  $\frac{z_1}{z_2}$  in rectangular form.

11.  $z_1 = 3cis80^\circ; z_2 = \frac{1}{2}cis40^\circ$

12.  $z_1 = 5cis \frac{2\pi}{3}; z_2 = 4cis \frac{3\pi}{4}$

13. Find the square roots of  $i$ 14. Find square roots of  $1 - \sqrt{3}i$

Use De Moivre's Theorem to evaluate each expression.

15.  $(1-i)^3$

16.  $(1+i)^{-4}$

17.  $(i)^4$

18.  $(-\sqrt{3}-i)^3$

Find 4 polar coordinates for each point ( 2 pos and 2 neg r)

19.  $(1, 1)$

20.  $(2, -2)$

21.  $(1, -\sqrt{3})$

22.  $(-9, 0)$

Find the rectangular coordinates for each point.

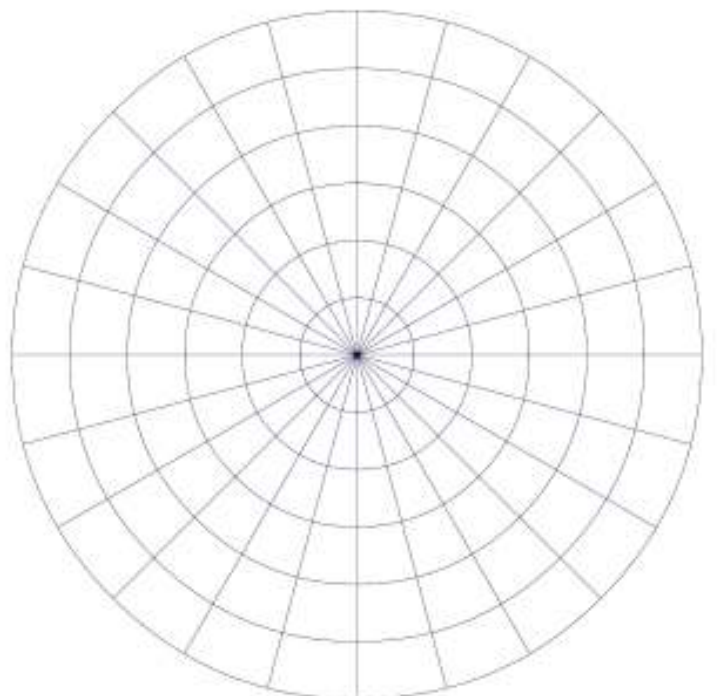
23.  $(-4, 300^\circ)$

24.  $(-6, \frac{-\pi}{3})$

25.  $(-\frac{3}{2}, \frac{-\pi}{4})$

26.  $(3, \frac{-2\pi}{3})$

27. Graph  $r = 1 - 2\cos \theta$



Answers:

1.  $4\sqrt{2}\text{cis}45^\circ$       2.  $2\text{cis}120^\circ$       3.  $\sqrt{5}\text{cis}243.4^\circ$       4.  $1\text{cis}180^\circ$       5.  $1\text{cis}90^\circ$

6.  $1\text{cis}270^\circ$       7.  $\frac{1}{4} + \frac{\sqrt{3}}{4}i$       8.  $-8 + 0i$       9.  $2\sqrt{3} - 2i$       10.  $0 - i$

11.  $-\frac{3}{4} + \frac{3\sqrt{3}}{4}i$       b.  $4.6 + 3.9i$       12a.  $-5.2 - 19.3i$       12b.  $1.207 - 0.324i$

13.  $\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}i; -\frac{\sqrt{2}}{2} - \frac{\sqrt{2}}{2}i$       14.  $-\frac{\sqrt{6}}{2} + \frac{\sqrt{2}}{2}i; \frac{\sqrt{6}}{2} - \frac{\sqrt{2}}{2}i$

15.  $-2 - 2i$       16.  $-\frac{1}{4} + 0i$       17.  $1 + 0i$       18.  $0 - 8i$

19.  $(\sqrt{2}, 45^\circ); (\sqrt{2}, -315^\circ); (-\sqrt{2}, 225^\circ); (-\sqrt{2}, -135^\circ)$

20.  $(2\sqrt{2}, 315^\circ); (2\sqrt{2}, -45^\circ); (-2\sqrt{2}, 135^\circ); (-2\sqrt{2}, -225^\circ)$

21.  $(2, 300^\circ); (2, -60^\circ); (-2, 120^\circ); (-2, -240^\circ)$       22.  $(9, 180^\circ), (9, -180^\circ); (-9, 0^\circ); (-9, -360^\circ)$

23.  $(-2, 2\sqrt{3})$       24.  $(-3, 3\sqrt{3})$       25.  $\left(\frac{-3\sqrt{2}}{4}, \frac{3\sqrt{2}}{4}\right)$       26.  $\left(\frac{-3}{2}, \frac{-3\sqrt{3}}{2}\right)$

27.

