

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

1. $z_1 = 3cis\frac{\pi}{2}; z_2 = cis\left(\frac{-\pi}{2}\right)$

2. $z_1 = 2cis135^\circ; z_2 = \frac{2}{3}cis90^\circ$

Use De Moivre's Theorem to evaluate each expression. Express your answers in rectangular form.

3. $(-1 + \sqrt{3}i)^{-5}$

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

5. $(-i)^{-5}$

6. $(2 - 2\sqrt{3}i)^2$

Express each complex number in rectangular form

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

8. $3cis\frac{5\pi}{4}$

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

9. $-2 - 3i$

10. $\frac{1}{2} - \frac{\sqrt{3}}{2}i$

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

11. $(-1, 1)$

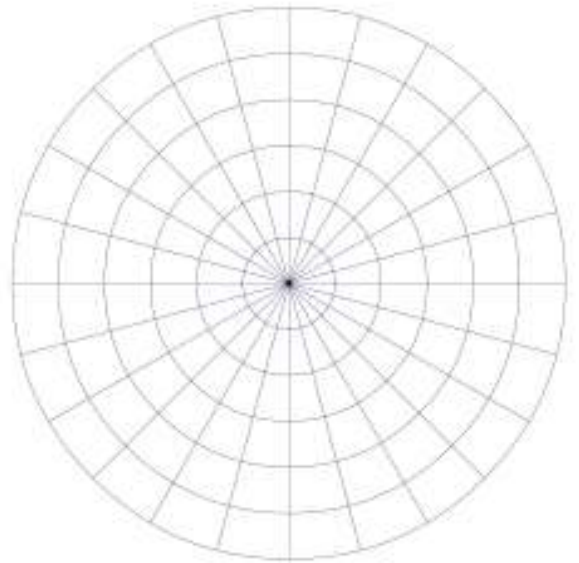
12. $(-1, -\sqrt{3})$

Find the rectangular coordinates for each point.

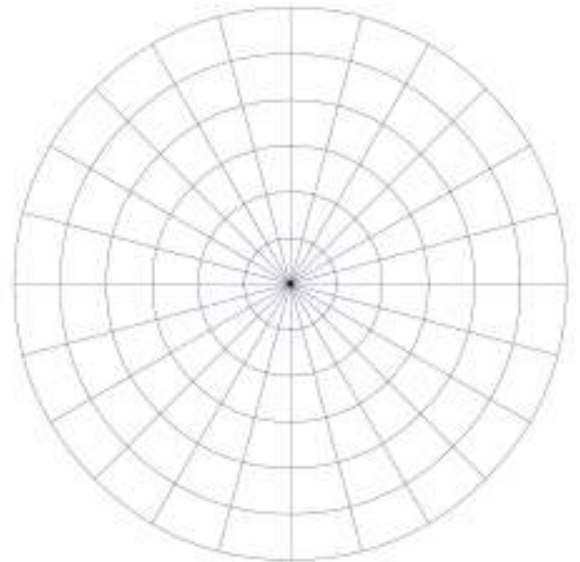
13. $\left(1, \frac{7\pi}{6}\right)$

14. $\left(-3, \frac{5\pi}{6}\right)$

15. Graph $r = \cos \theta - 1$ (cardioid)



16. Graph $r = 2 - 3\sin \theta$ (limaçon)



17. Find the cube roots of 8.

18. Find the cube roots of $-8i$.

Answers:

1. 3 1b. -3 2a. $\frac{-2\sqrt{2}}{3} - \frac{2\sqrt{2}}{3}i$ 2b. $\frac{3\sqrt{2}}{2} + \frac{3\sqrt{2}}{2}i$ 3. $\frac{-1}{64} + \frac{\sqrt{3}}{64}i$

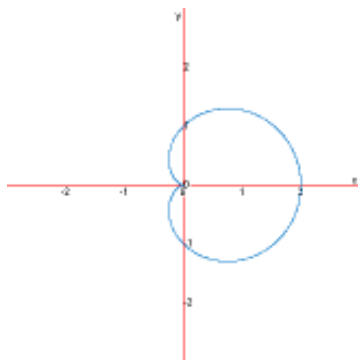
4. -8i 5. 1 6. $-8 - 8\sqrt{3}i$ 7. 2i 8. $\frac{-3\sqrt{2}}{2} - \frac{3\sqrt{2}}{2}i$

9. $\sqrt{13} \text{cis} 236.3^\circ$ 10. 1 cis 300°

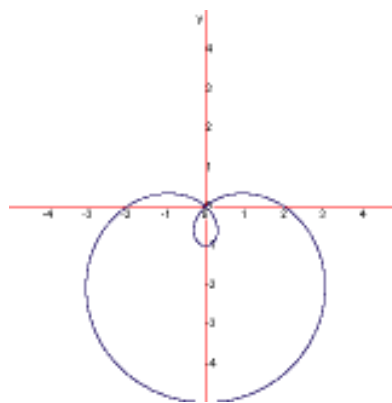
11. $(\sqrt{2}, 135^\circ); (\sqrt{2}, -225^\circ); (-\sqrt{2}, 315^\circ); (-\sqrt{2}, -45^\circ)$ 12. $(2, 240^\circ); (2, -120^\circ); (-2, 60^\circ); (-2, -300^\circ)$

13. $\left(\frac{-\sqrt{3}}{2}, -\frac{1}{2}\right)$ 14. $\left(\frac{-3\sqrt{3}}{2}, \frac{-3}{2}\right)$

15.



16.



17. $2; -1 + \sqrt{3}i; -1 - \sqrt{3}i$

18. $2i; -\sqrt{3} - i; \sqrt{3} - i$