Thursday Night PreCalculus, March 7, 2024

Polar Coordinates
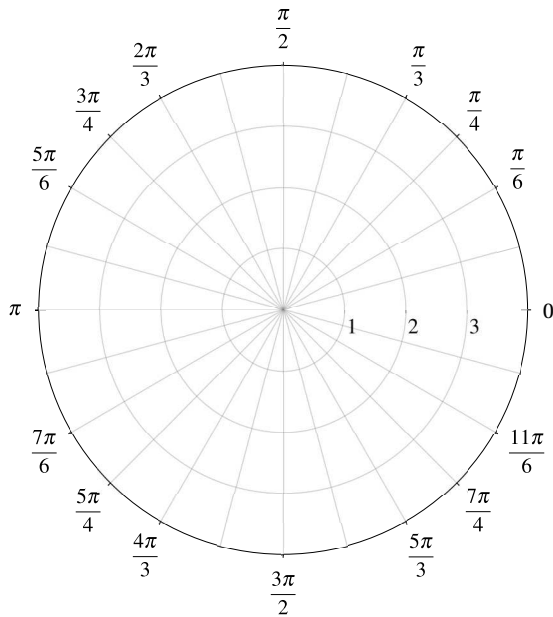
Problems

1. Plot the points whose polar coordinates are given.

(a) $\left(2, \dfrac{5\pi}{6}\right)$ (b) $\left(-1, \dfrac{\pi}{4}\right)$ (c) $\left(3, -\dfrac{2\pi}{3}\right)$ (d) $\left(-2, -\dfrac{\pi}{6}\right)$

2. Convert the polar coordinates to rectangular coordinates.

(a) $\left(\sqrt{2}, \dfrac{5\pi}{3}\right)$ (b) $\left(-2, -\dfrac{\pi}{6}\right)$

3. Convert the rectangular coordinates to polar coordinates.

(a) $(2, 2\sqrt{3})$ (b) $(-1, 2)$

4. Express the complex number $1 - i$ in the polar form $(r \cos\theta) + i\,(r \sin\theta)$.

5. Create a table of values to sketch each polar graph. Use technology to check your work.

    (a) $r = 1 + \cos\theta$

    (b) $r = 3\sin(2\theta)$

    (c) $r = \theta, \quad \theta \geq 0$

6. Consider the polar function $r(\theta) = \cos\left(\dfrac{\theta}{2}\right)$ for $0 \leq \theta \leq 4\pi$.

    (a) Graph the polar function over the given domain.

    (b) Find the average rate of change of r with respect to θ over the interval $0 \leq \theta \leq \dfrac{\pi}{2}$. Is the radius increasing or decreasing over the given interval? Explain your reasoning.