

HW11.1 Polar Battleship

Convert: Convert the polar coordinates to rectangular coordinates:

$$\begin{array}{cccccc} (3, \frac{\pi}{4}) & (2, \frac{\pi}{6}) & (5, \frac{\pi}{3}) & (3, \pi) & (4, 0) & (2, \frac{2\pi}{3}) \\ (\frac{3\sqrt{2}}{2}, \frac{3\sqrt{2}}{2}) & (\sqrt{3}, 1) & (\frac{5}{2}, \frac{5\sqrt{3}}{2}) & (-3, 0) & (4, 0) & (-1, \sqrt{3}) \end{array}$$

Convert the rectangular coordinates to polar coordinates ($r > 0, 0 \leq \theta < 2\pi$):

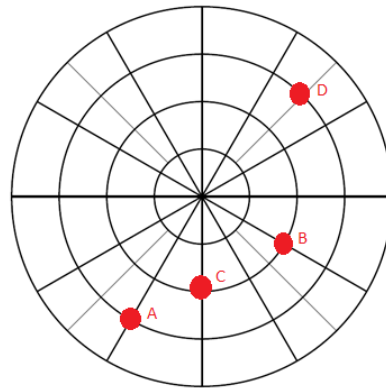
$$\begin{array}{cccccc} (\sqrt{2}, \sqrt{2}) & (2\sqrt{3}, 2) & (3\sqrt{2}, -3\sqrt{2}) & (2, 5) & & (-10, e) \\ (2, \frac{\pi}{4}) & (4, \frac{\pi}{6}) & (6, \frac{7\pi}{4}) & (\sqrt{29}, \tan^{-1} \frac{5}{2}) & (\sqrt{100 + e^2}, \tan^{-1} \frac{e}{-10} + \pi) & \\ & & & \approx (5.4, 1.2) & \approx (10.4, 2.8762) & \end{array}$$

Problems: State at least 3 more polar coordinate representations for the given polar point:

$$\begin{array}{cc} (3, \frac{\pi}{2}) & (2, \frac{5\pi}{6}) \\ (3, \frac{-3\pi}{2}), (-3, \frac{3\pi}{2}), (-3, -\frac{\pi}{2}) & (2, \frac{-7\pi}{6}), (-2, \frac{11\pi}{6}), (-2, -\frac{\pi}{6}) \end{array}$$

Graph and label each polar point on the polar axis:

$$\begin{array}{l} \text{A: } (3, \frac{4\pi}{3}) \\ \text{B: } (2, -\frac{\pi}{6}) \\ \text{C: } (-2, \frac{\pi}{2}) \\ \text{D: } (-3, -\frac{3\pi}{4}) \end{array}$$



Write each rectangular equation as a polar equation (solved for r):

$$\begin{array}{ccc} x = -5 & y = 3 & x^2 + y^2 = 4 \\ r \cos \theta = -5 & r \sin \theta = 3 & r^2 \cos^2 \theta + r^2 \sin^2 \theta = 4 \\ r = -5 \sec \theta & r = 3 \csc \theta & r^2 (\cos^2 \theta + \sin^2 \theta) = 4 \\ & & r^2 = 4 \\ & & r = \pm 2 \end{array}$$

Write each polar equation as a rectangular equation:

$$r = \frac{5}{5 \cos \theta + 6 \sin \theta}$$

$$5r \cos \theta + 6r \sin \theta = 5$$

$$5x + 6y = 5$$

$$r = \frac{2}{3 \cos \theta + 4 \sin \theta}$$

$$3r \cos \theta + 4r \sin \theta = 2$$

$$3x + 4y = 2$$