Spiral Review:

Write the complex number in trigonometric form.

$$-2-2\sqrt{3}i$$

$r=\sqrt{(-2)^2+(-2\sqrt{3})^2}$

$=\sqrt{4+12}$

$=\sqrt{16}$

$r=4$

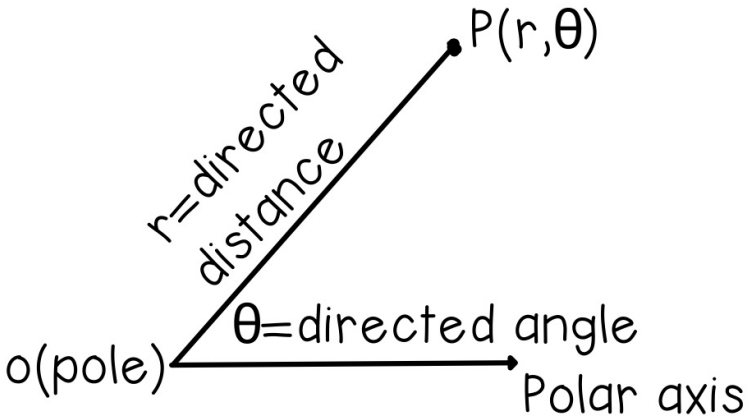
$\tan\theta=\frac{+2\sqrt{3}}{+2}$

$=\sqrt{3}$

$\theta=\frac{4\pi}{3}$

$z=4\left(\cos\frac{4\pi}{3}+i\sin\frac{4\pi}{3}\right)$

p.677 9.5 Polar Coordinates

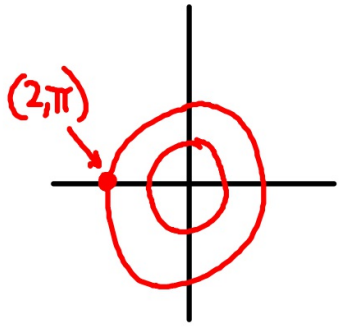


Example:

(2, π)

(r, θ)

lies 2 units from the pole on the terminal side of the angle θ=π.



Students can graph the point in polar coordinates and find the rectangular coordinates for the point.

Coordinate Conversion:

Polar-to-Rectangular (x,y)

$x = r\cos\theta$

$y = r\sin\theta$

Rectangular-to-Polar (r,θ)

$\tan\theta = y/x$

$r^2 = x^2 + y^2$

Students can graph the point in polar coordinates and find the rectangular coordinates for the point.

Example 1: Plot the point in polar coordinates and find the corresponding rectangular coordinates for the point.

a.) $\left(3, -\frac{3\pi}{4}\right) \rightarrow (x,y)$

$x = r\cos\theta$

$= 3\cos\left(-\frac{3\pi}{4}\right)$

$= 3\left(-\frac{\sqrt{2}}{2}\right)$

$x = -\frac{3\sqrt{2}}{2}$

$y = r\sin\theta$

$= 3\sin\left(-\frac{3\pi}{4}\right)$

$= 3\left(-\frac{\sqrt{2}}{2}\right)$

$y = \frac{3\sqrt{2}}{2}$

$\left(-\frac{3\sqrt{2}}{2}, \frac{3\sqrt{2}}{2}\right)$

Students can graph the point in polar coordinates and find the rectangular coordinates for the point.

b.) $(2, \frac{\pi}{6}) \rightarrow (x,y)$

$x = 2\cos\frac{\pi}{6}$ $\quad y = 2\sin\frac{\pi}{6}$

$= 2\left(\frac{\sqrt{3}}{2}\right)$ $\quad = 2\left(\frac{1}{2}\right)$

$x = \sqrt{3}$ $\quad y = 1$

$(\sqrt{3}, 1)$

Students can graph the point in rectangular coordinates and find two sets of polar coordinates for the point $0 \le \theta < 2\pi$.

Example 2: Plot the point in rectangular coordinates and find two sets of polar coordinates for the point $0 \le \theta < 2\pi$.

a.) $(2, 2) \rightarrow (r,\theta)$

$r = \sqrt{2^2+2^2}$

$r = 2\sqrt{2}$

$\tan\theta = \frac{2}{2}$

$= 1$

$\theta = \frac{\pi}{4}$

$(2\sqrt{2}, \frac{\pi}{4})$

b.) $(-1, 0)$

$r = \sqrt{(-1)^2+0^2}$

$= \sqrt{1}$

$r = 1$

$\tan\theta = \frac{0}{-1}$

$\theta = \pi$

$(1, \pi)$

Turn-in:
p. 681 (19, 33)

HW:
p.681 (20-26 all, 34-40 all)

(39,40) → radians