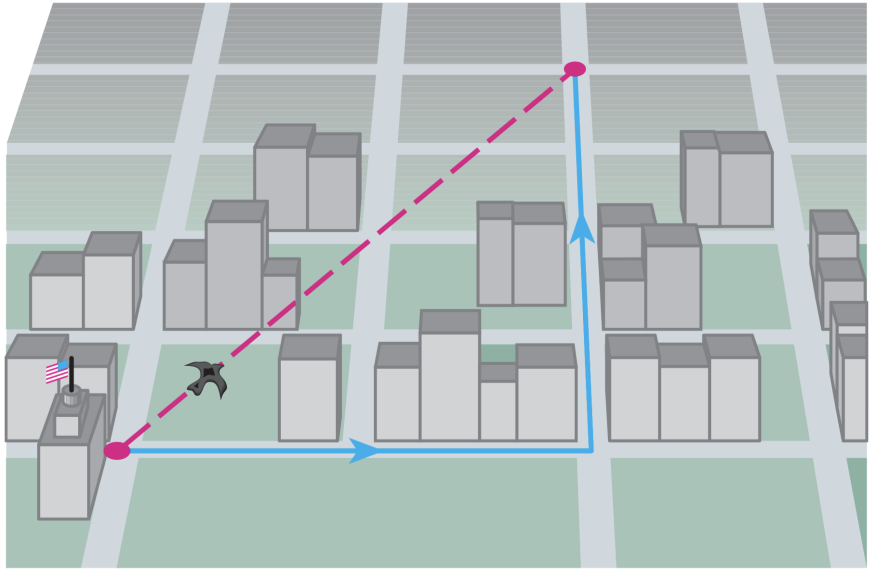
How does the Polar Coordinate System work?

Quick Check

How would a crow go from point A in Manhattan to Point B in Manhattan?

Would the crow follow the directions from google maps like a car?

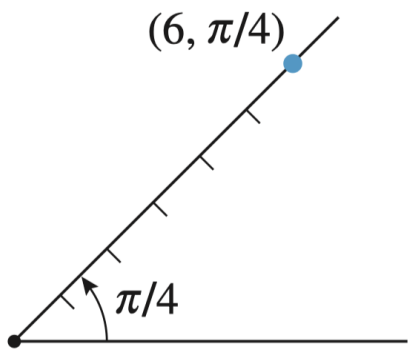


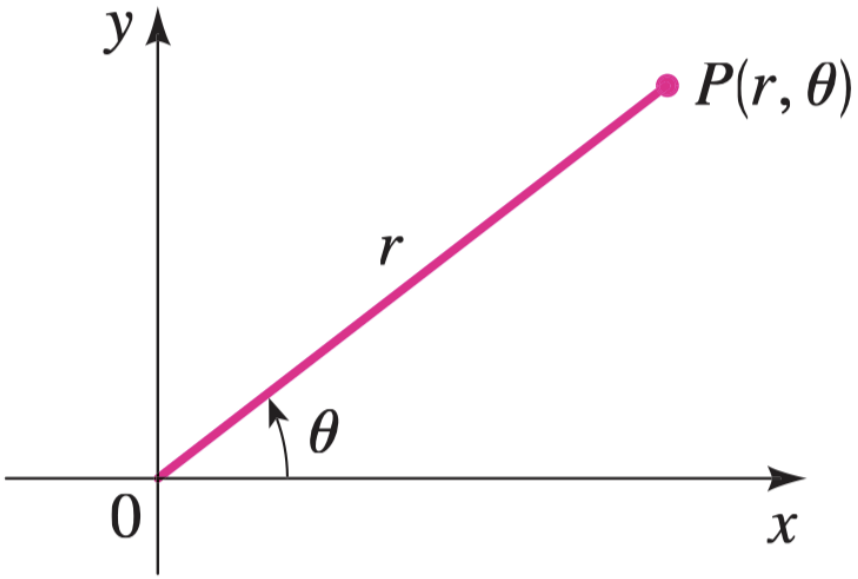
Directions from a different point of view

r is the distance from O to P

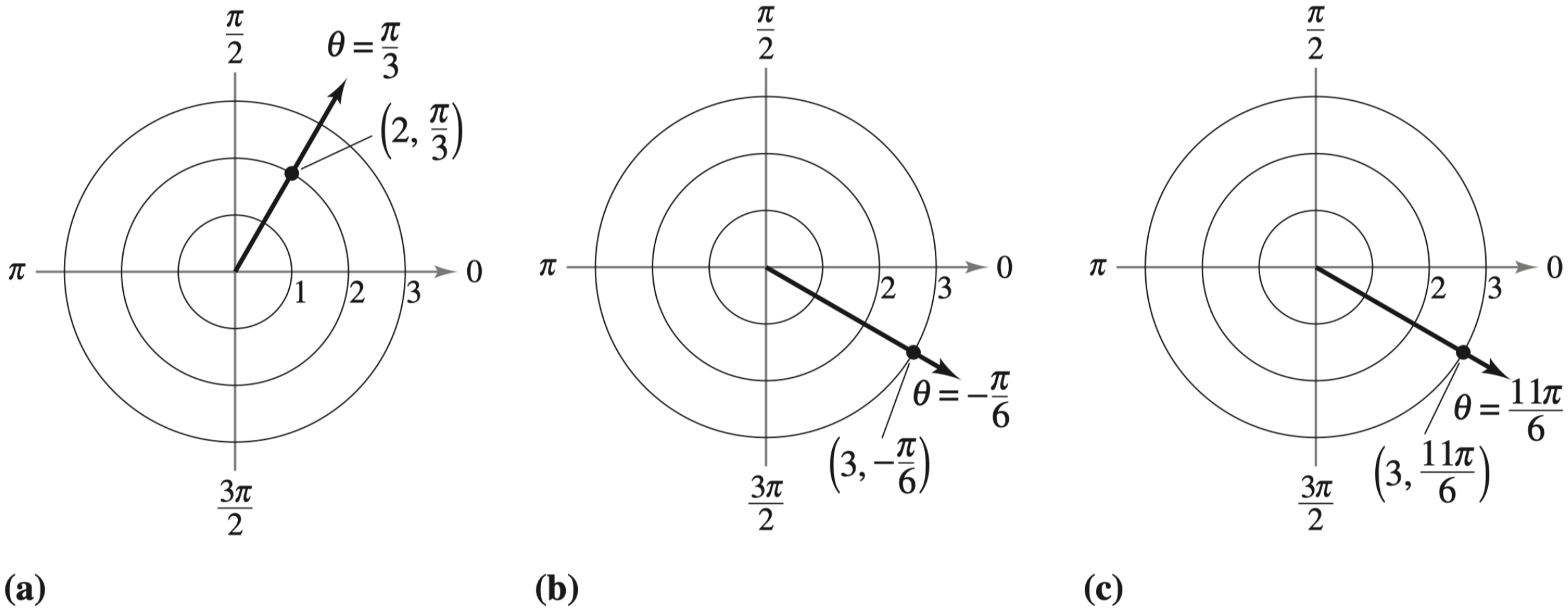
θ is the angle between the polar axis and the segment $\overline{OP}$

Example:

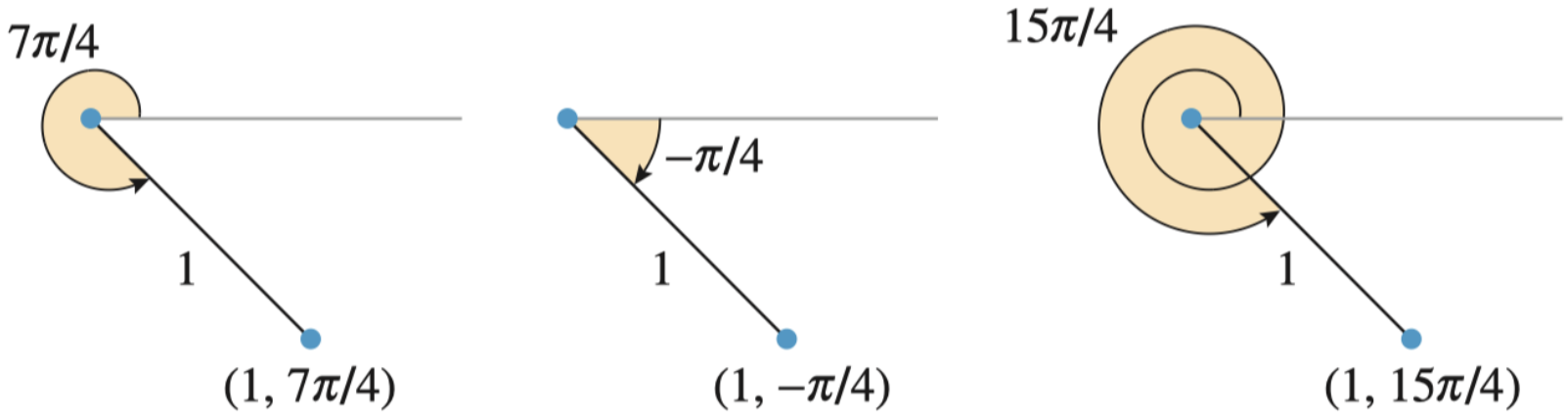


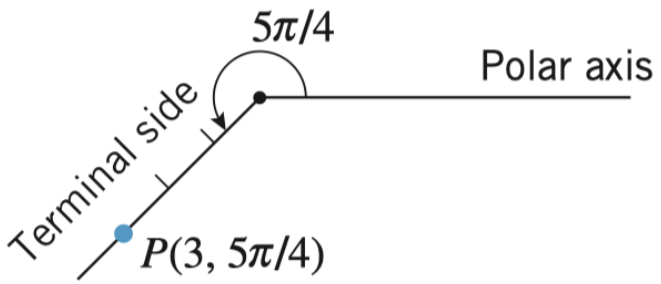


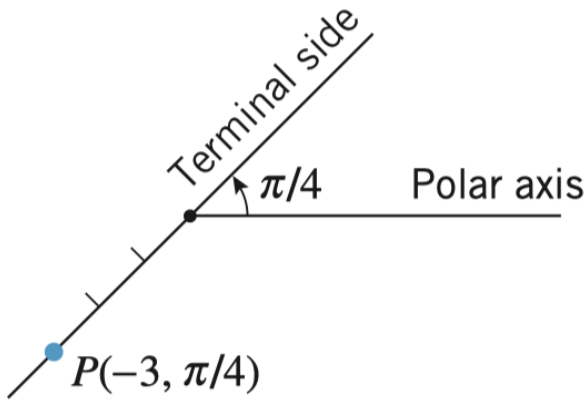
Reading Polar Graphs



Reading Polar Graphs







📌 Note: $(-3, \pi/4) = (3, \pi/4 + \pi)$. There are multiple representations for one point.

Practice

Plot the points whose polar coordinates are given.

a. $(1, 5\pi/4)$

b. $(2, 3\pi)$

c. $(2, -2\pi/3)$

d. $(-3, 3\pi/4)$

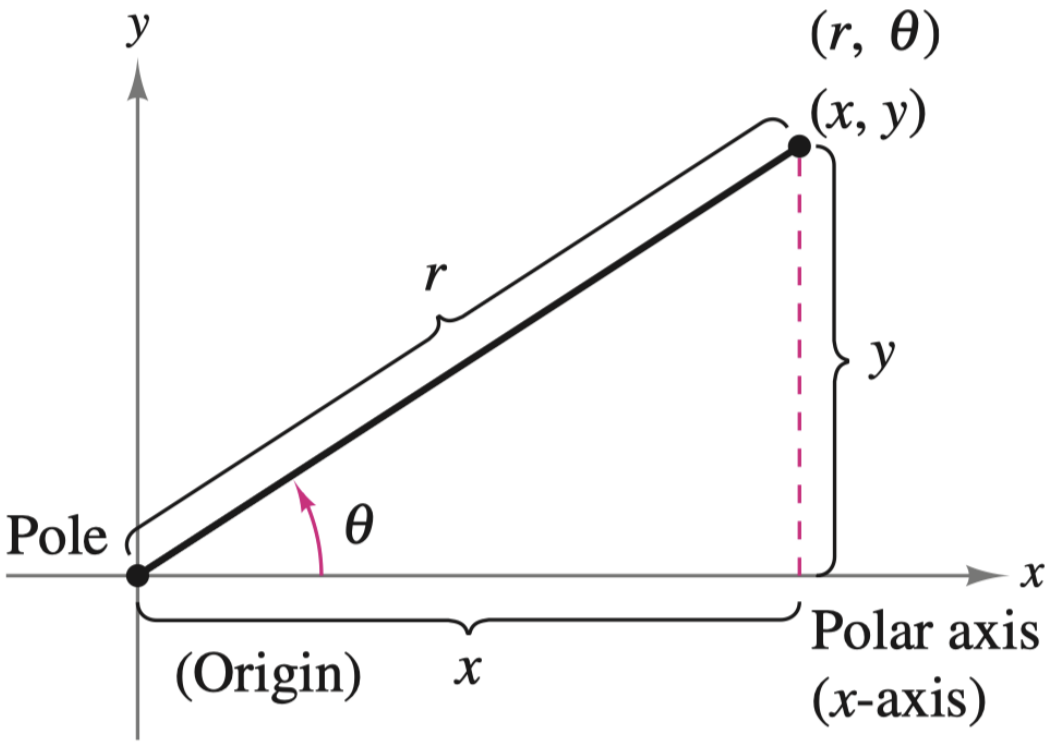
Rectangular $\longleftrightarrow$ Polar Coordinates

The polar coordinates (r, θ) of a point are related to the rectangular coordinates (x, y) as follows:

1. $x = r\cos\theta$
   $y = r\sin\theta$

1. $\tan\theta = \dfrac{y}{x}$

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



Coordinate Conversion

Polar to Rectangular conversion

a. $(r, \theta) = (2, \pi)$

b. $(r, \theta) = (\sqrt{3}, \pi/6)$

Rectangular to Polar Conversion

c. $(x, y) = (-1, 1)$

d. $(x, y) = (0, 2)$

Converting Equations

1. Express the equation $x^2 = 4y$ in polar form.

2. Convert $x^2 + y^2 = 9$ to polar form. try

3. Convert $r = 5\sec\theta$ to rectangular form.

4. Convert $r = 2\sin\theta$ to rectangular form. try

5. Convert $r = 2 + 2\cos\theta$ to rectangular form.

6. Convert $r = \sqrt{5}$ to rectangular form. try

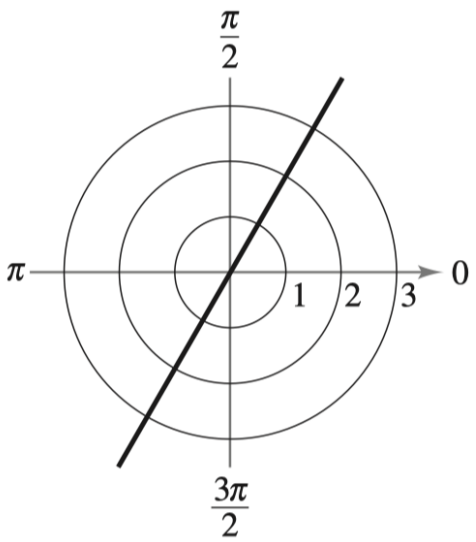
Polar Graphs

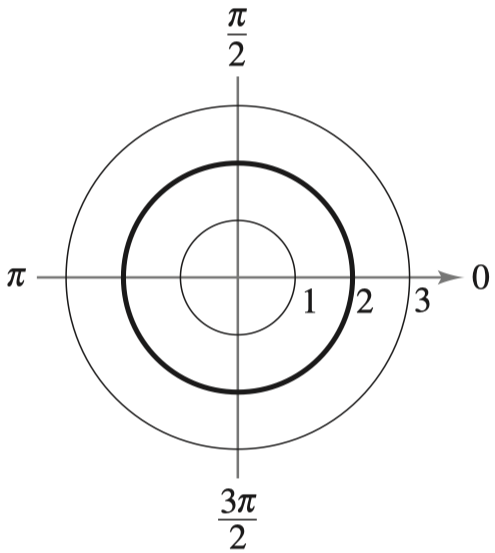
Match the equation to the graph.

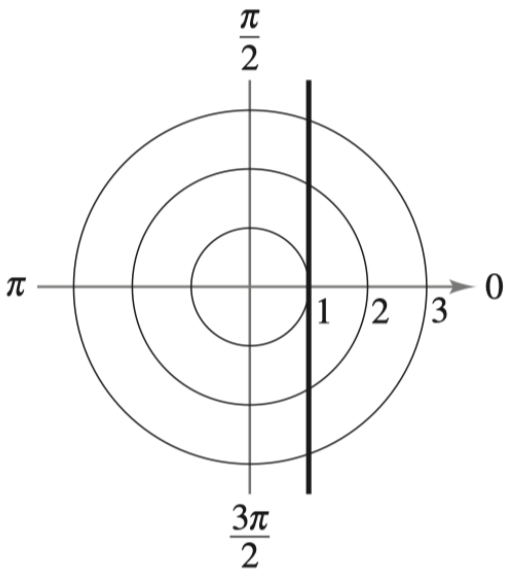
a. $r = 2$

b. $\theta = \dfrac{\pi}{3}$

c. $r = \sec\theta$

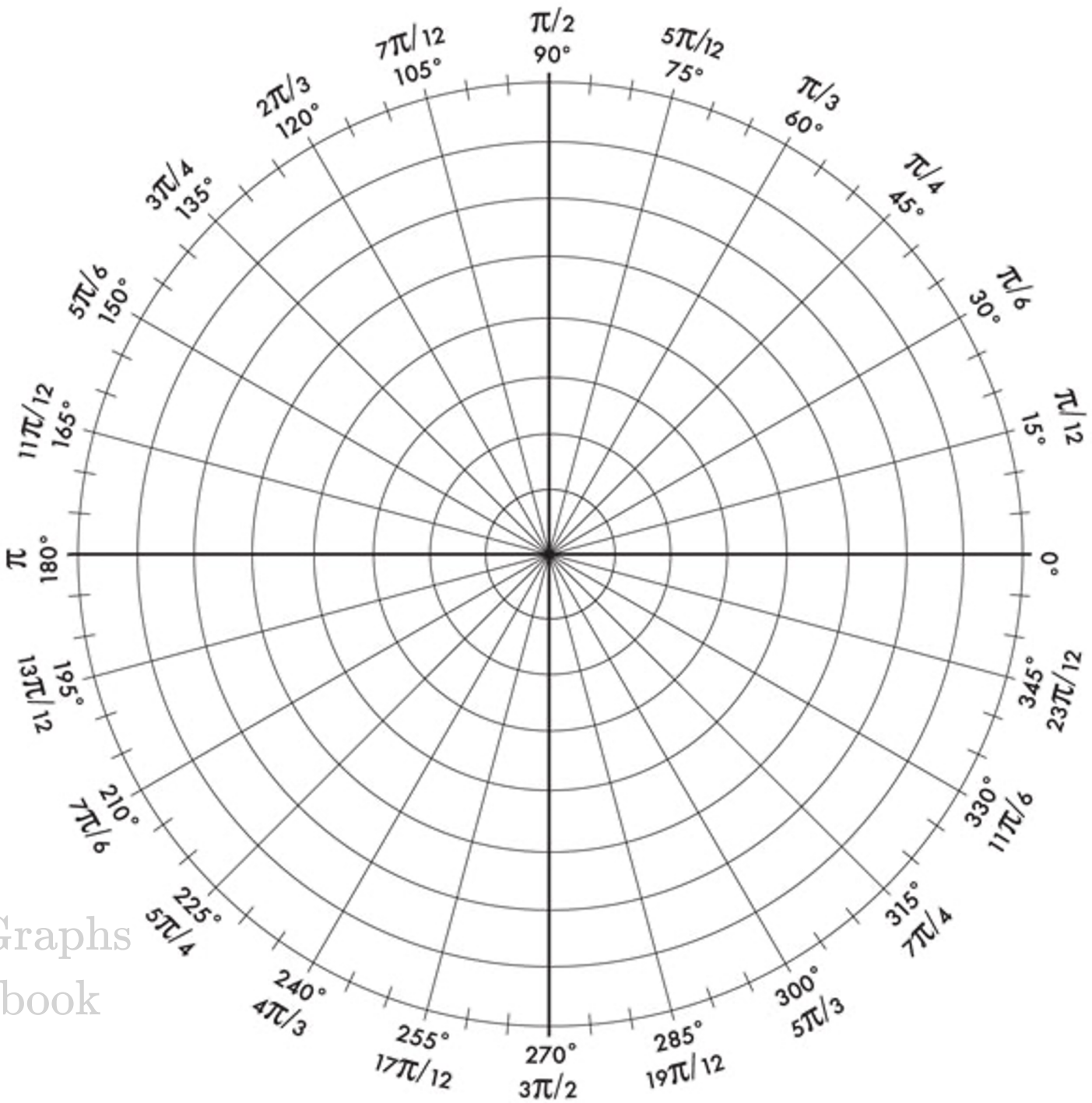






Rose Curve

Sketch the graph of $r = 2\cos 3\theta$



Handout Special Graphs
Practice from textbook