Course Number

Instructor

Date

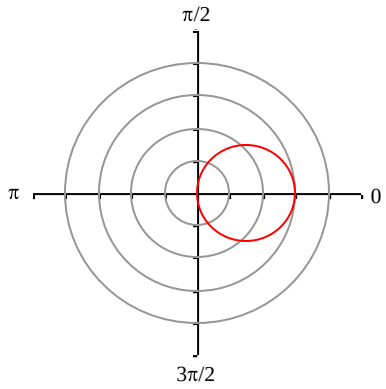
Section 10.8 Graphs of Polar Equations

Objective: In this lesson you learned how to graph polar equations.

I. Introduction (Page 783)

What you should learn
How to graph polar equations by point plotting

Example 1: Use point plotting to sketch the graph of the polar equation $r = 3\cos\theta$.



II. Symmetry (Pages 784–785)

What you should learn
How to use symmetry to sketch graphs of polar equations

The graph of a polar equation is symmetric with respect to the following if the given substitution yields an equivalent equation.

	Substitution
1) The line $\theta = \pi/2$:	Replace (r, θ) by $(r, \pi - \theta)$ or $(-r, -\theta)$
2) The polar axis:	Replace (r, θ) by $(r, -\theta)$ or $(-r, \pi - \theta)$
3) The pole:	Replace (r, θ) by $(r, \pi + \theta)$ or $(-r, \theta)$

Example 2: Describe the symmetry of the polar equation $r = 2(1 - \sin\theta)$.

Symmetric with respect to the line $\theta = \pi/2$

III. Zeros and Maximum *r*-Values (Pages 785–786)

What you should learn
How to use zeros and maximum *r*-values to sketch graphs of polar equations

Two additional aids to sketching graphs of polar equations involve knowing the θ-values for which $|r|$ is maximum and knowing the θ-values for which $r = 0$.

Example 3: Describe the zeros and maximum r-values of the polar equation $r = 5\cos 2\theta$

The maximum value of $|r|$ is $|r| = 5$ when $\theta = 0, \pi/2, \pi, 3\pi/2$; the zeros of r occur at $\theta = \pi/4, 3\pi/4, 5\pi/4, 7\pi/4$

IV. Special Polar Graphs (Pages 787–788)

What you should learn
How to recognize special polar graphs

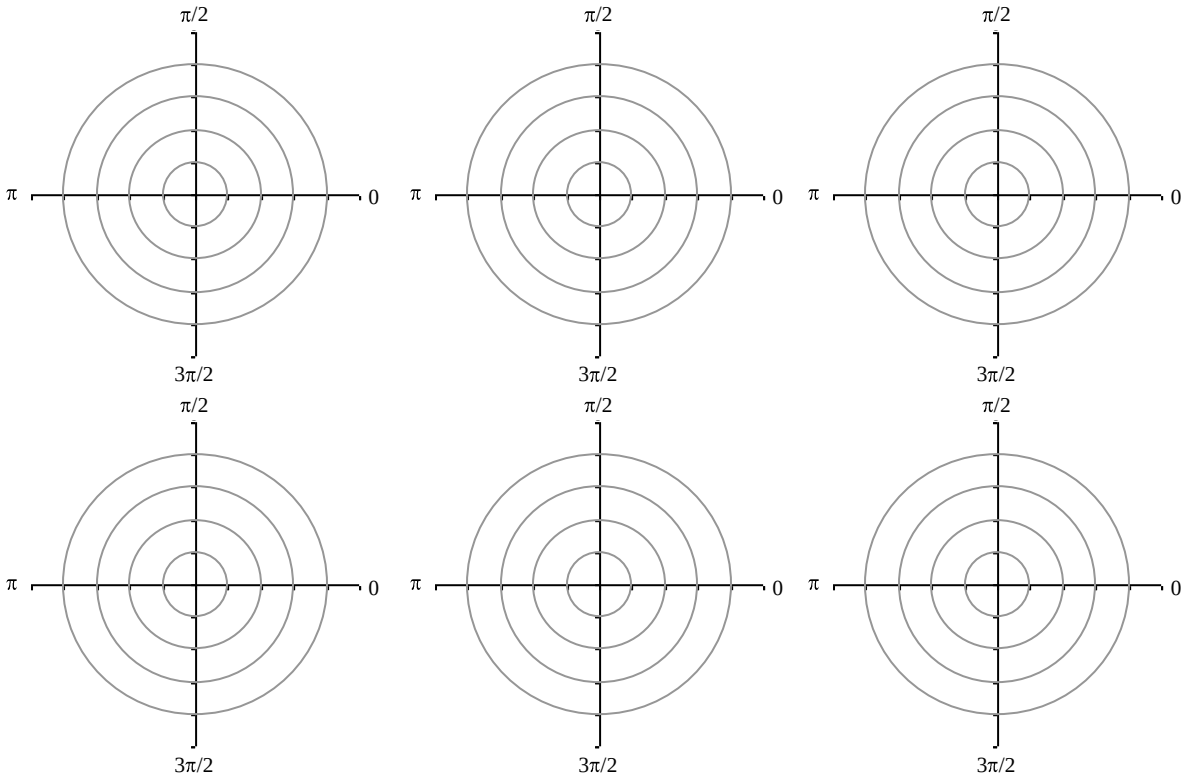
List the general equations that yield each of the following types of special polar graphs:

Limaçons: $r = a \pm b\cos\theta$, $r = a \pm b\sin\theta$, $a > 0$, $b > 0$

Rose curves: $r = a\cos n\theta$, $r = a\sin n\theta$, $n \geq 2$; n petals if n is odd; $2n$ petals if n is even

Circles: $r = a\cos\theta$, $r = a\sin\theta$

Lemniscates: $r^2 = a^2\sin 2\theta$; $r^2 = a^2\cos 2\theta$



Homework Assignment

Page(s)

Exercises