

Sections 8.5: Desmos Graphing Activity

Sometimes the graphs of polar equations are simply another way to express graphs that you've already seen written with rectangular equations.

Example 1: Use Desmos to graph the following polar equations, then figure out how you could express the graph using a rectangular equation.

(1) $\theta = \frac{\pi}{4}$

(3) $r = \frac{2}{4\cos\theta - 4\sin\theta}$

(2) $r = 3\csc\theta$



Other times, polar equations are a way to graph shapes that are not functions, and are not as easily converted to rectangular equations.

Example 2: Use Desmos to graph the following polar equations:

(1) $r = 3$

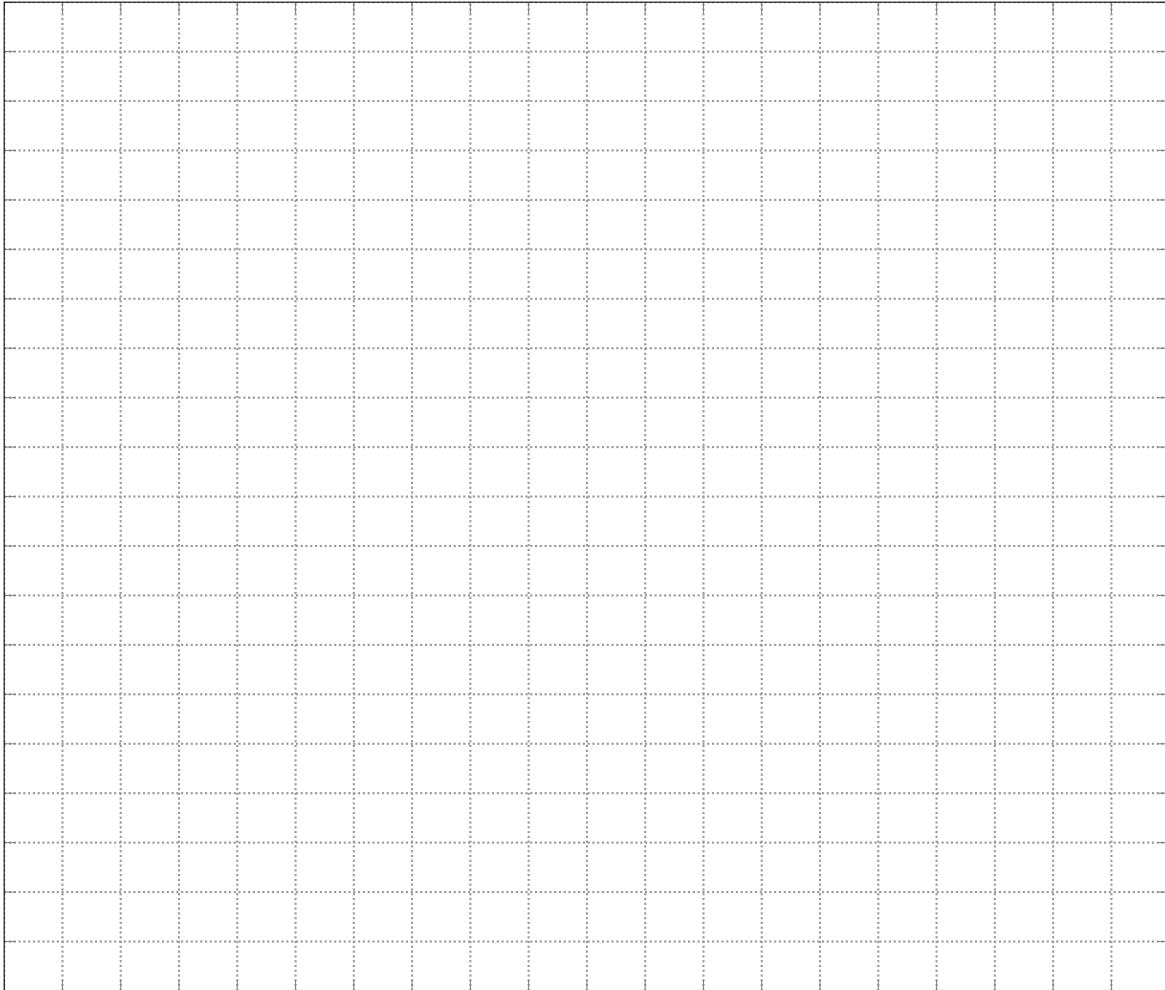
(3) $r = 4 \cos \theta$

(5) $r = 6 \sin \theta$

(2) $r = -1$

(4) $r = -8 \cos \theta$

(6) $r = -2 \sin \theta$



Brainstorm: What relationships can you find between the polar equations that look like $r = \pm a$, $r = \pm a \sin \theta$ or $r = \pm a \cos \theta$ and their graphs?

Example 3: Use Desmos to graph the following polar equations:

(1) $r = 4 + 4 \cos \theta$

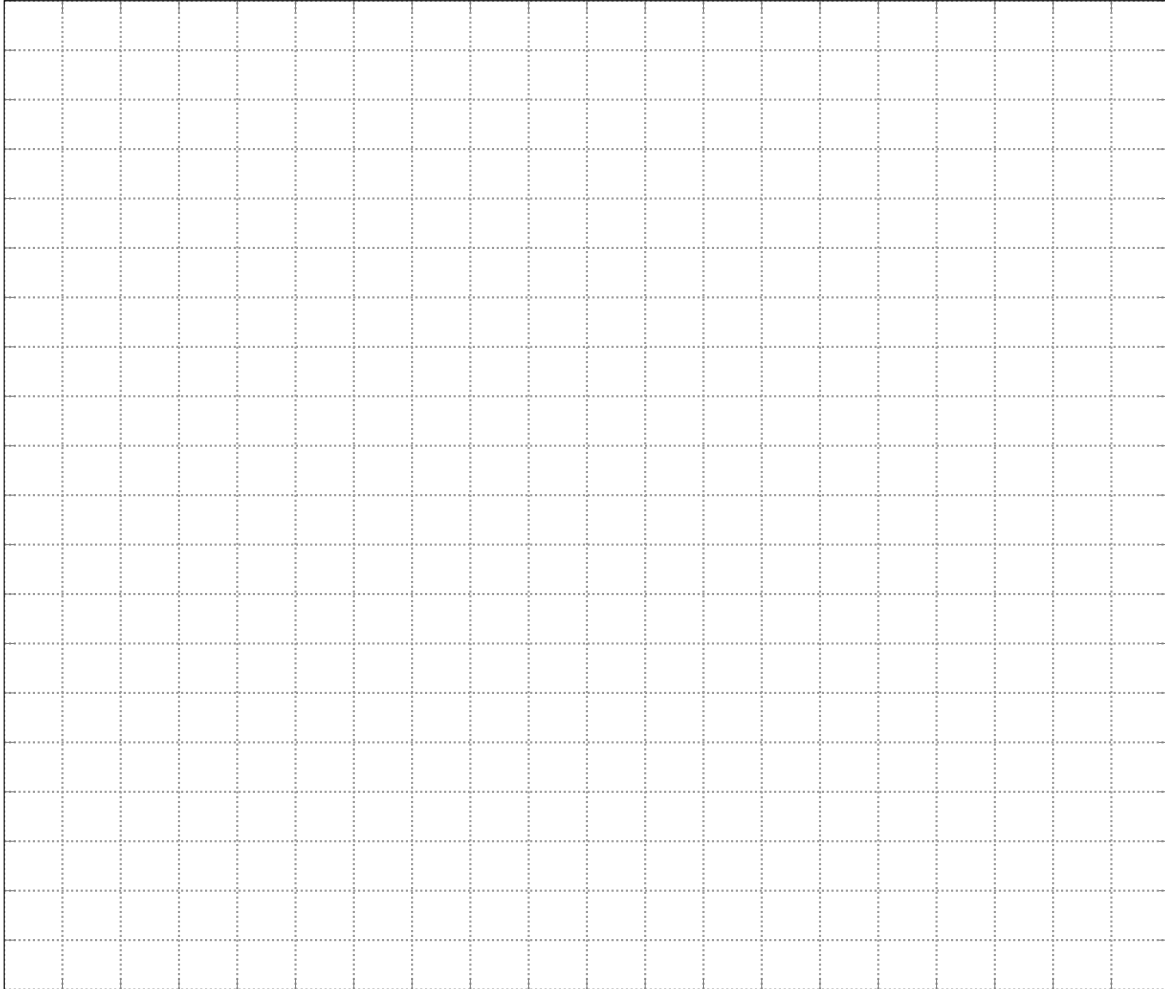
(3) $r = -2 - 2 \cos \theta$

(5) $r = 5 + 5 \sin \theta$

(2) $r = 2 - 2 \cos \theta$

(4) $r = 3 - 3 \sin \theta$

(6) $r = -5 + 5 \sin \theta$



Brainstorm: What relationships can you find between the polar equations that look like $r = \pm a \pm a \sin \theta$ or $r = \pm a \pm a \cos \theta$ and their graphs?

Example 4: Use Desmos to graph the following polar equations:

(1) $r = 4 + 3 \cos \theta$

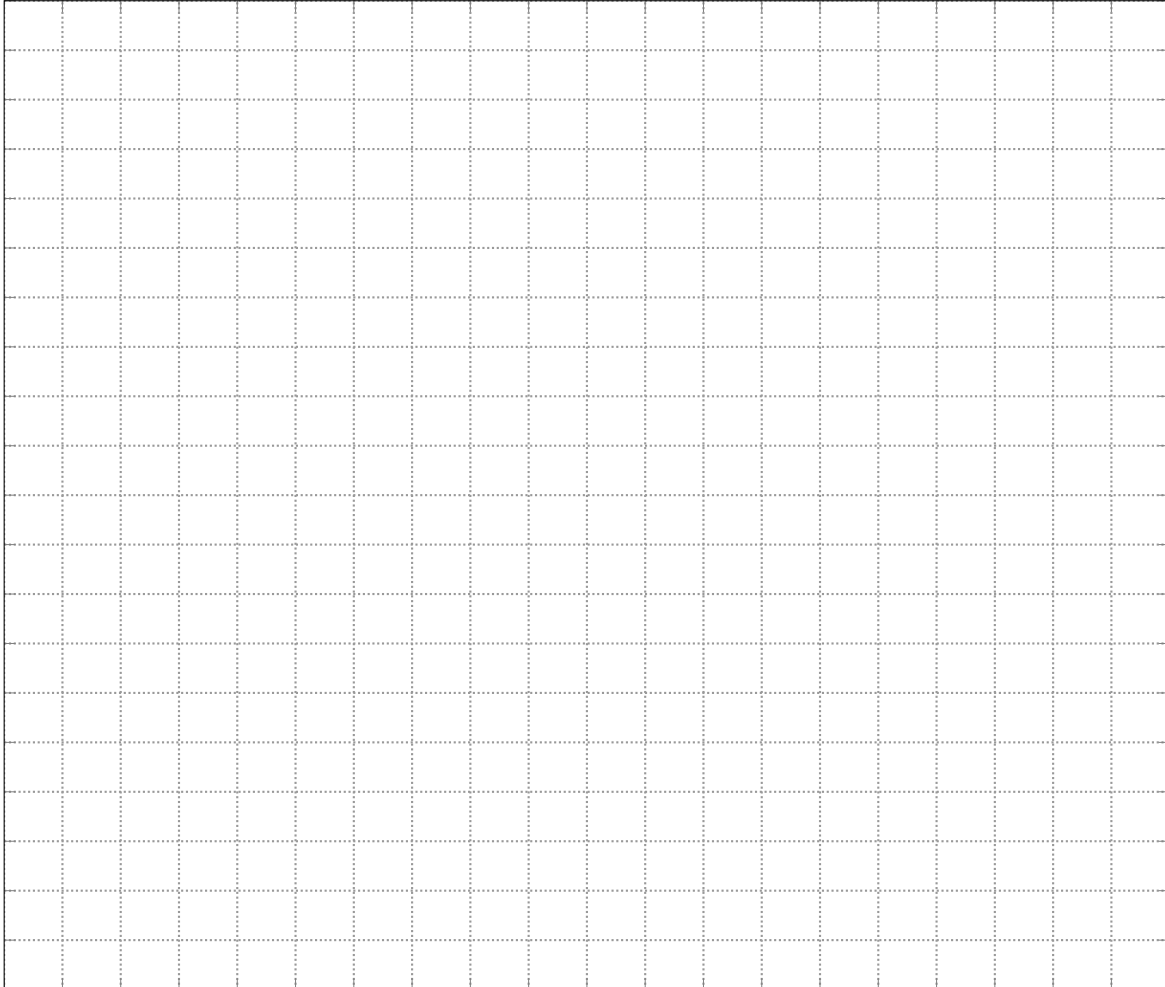
(3) $r = 6 - 4 \cos \theta$

(5) $r = -3 - 2 \sin \theta$

(2) $r = -4 + 3 \cos \theta$

(4) $r = 3 - 2 \sin \theta$

(6) $r = 5 + 3 \sin \theta$



Example 5: Use Desmos to graph the following polar equations:

(1) $r = 4 + 5 \cos \theta$

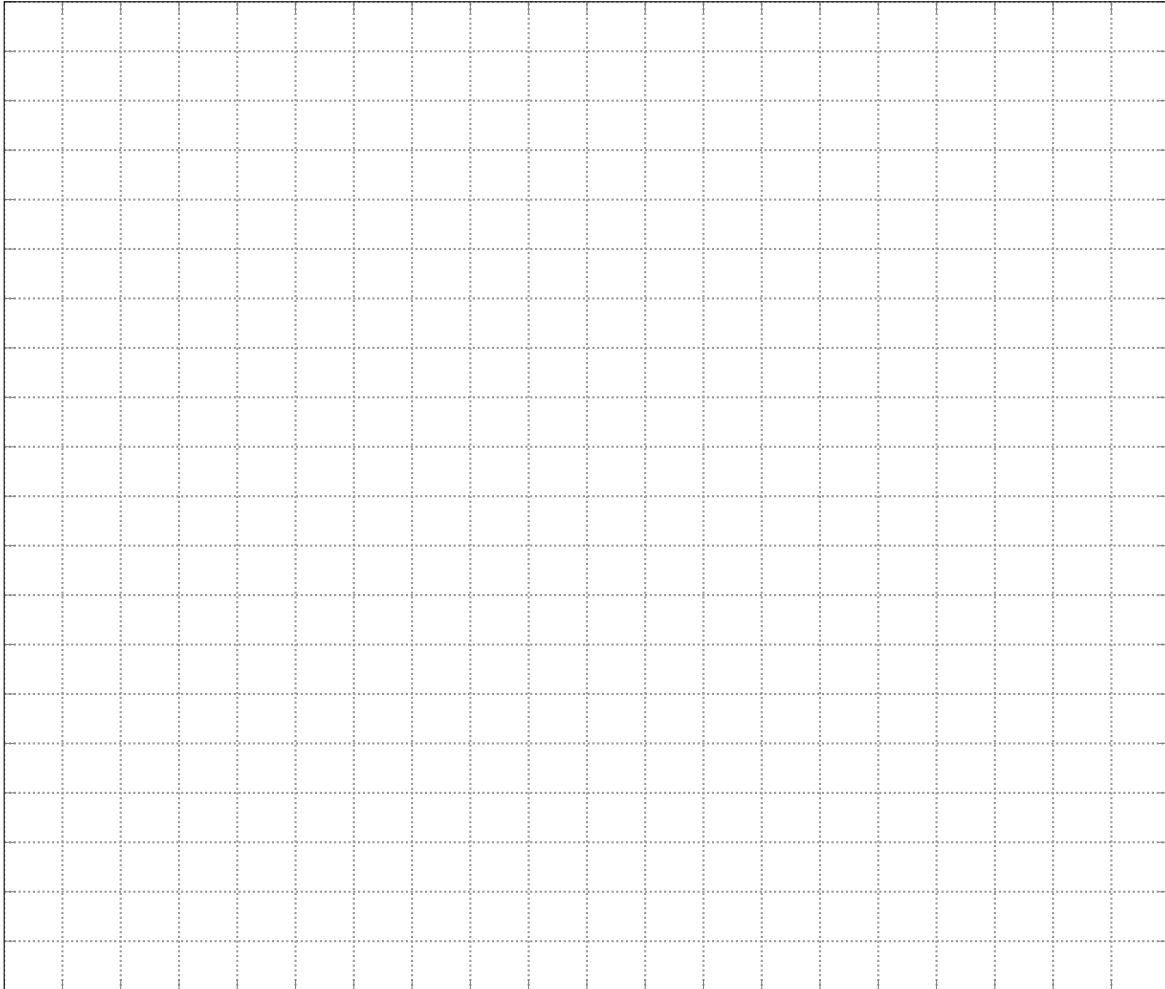
(3) $r = -3 - 6 \cos \theta$

(5) $r = 5 + 6 \sin \theta$

(2) $r = 3 - 6 \cos \theta$

(4) $r = -2 - 4 \sin \theta$

(6) $r = -5 + 6 \sin \theta$



Brainstorm: What is the difference between the equations in Example 4 and Example 5? What relationships can you find between the polar equations that look like $r = \pm a \pm b \sin \theta$ or $r = \pm a \pm b \cos \theta$ and their graphs?

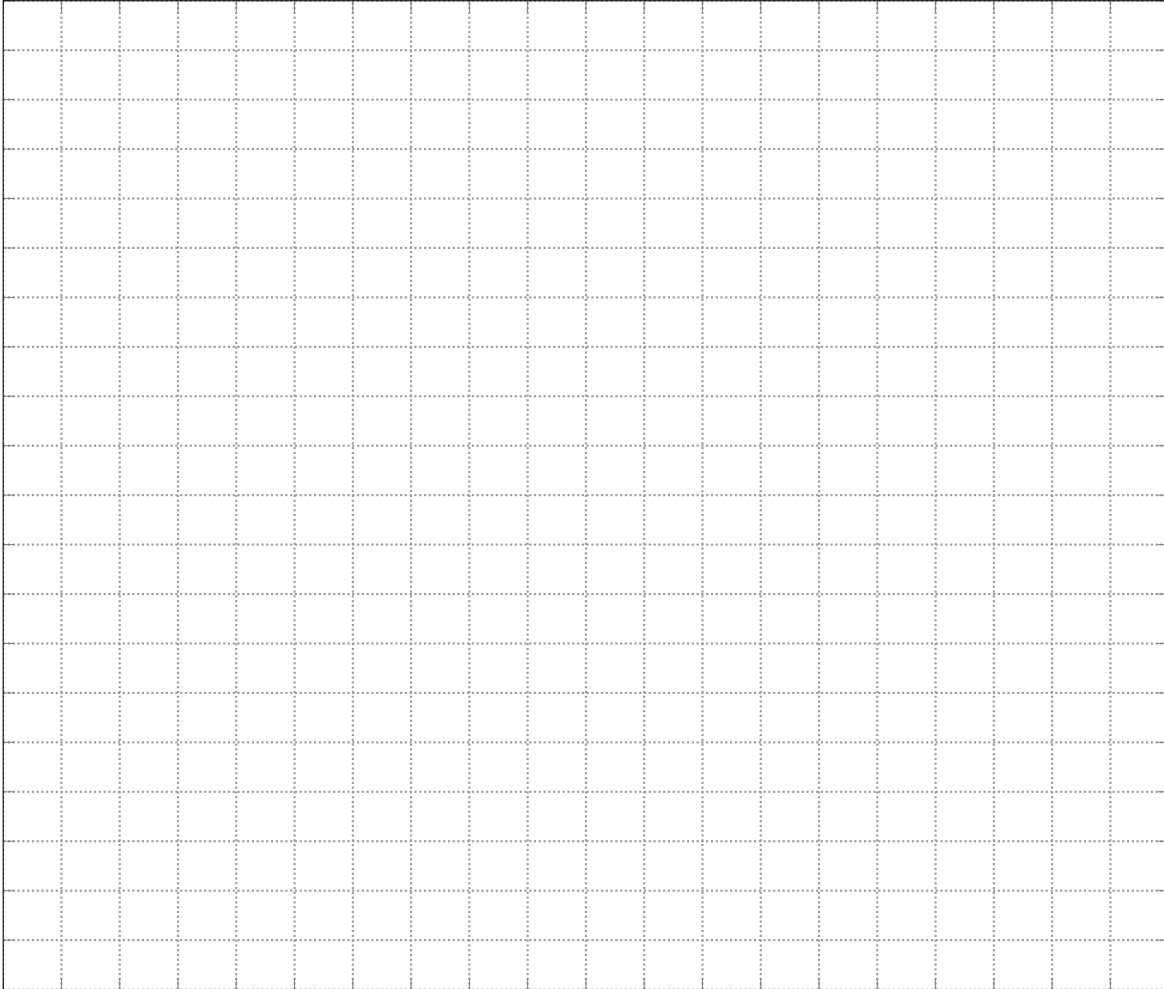
Example 6: Use Desmos to graph the following polar equations:

(1) $r = 2 \cos 2\theta$

(3) $r = -4 \sin 6\theta$

(2) $r = -3 \cos 4\theta$

(4) $r = 5 \sin 2\theta$



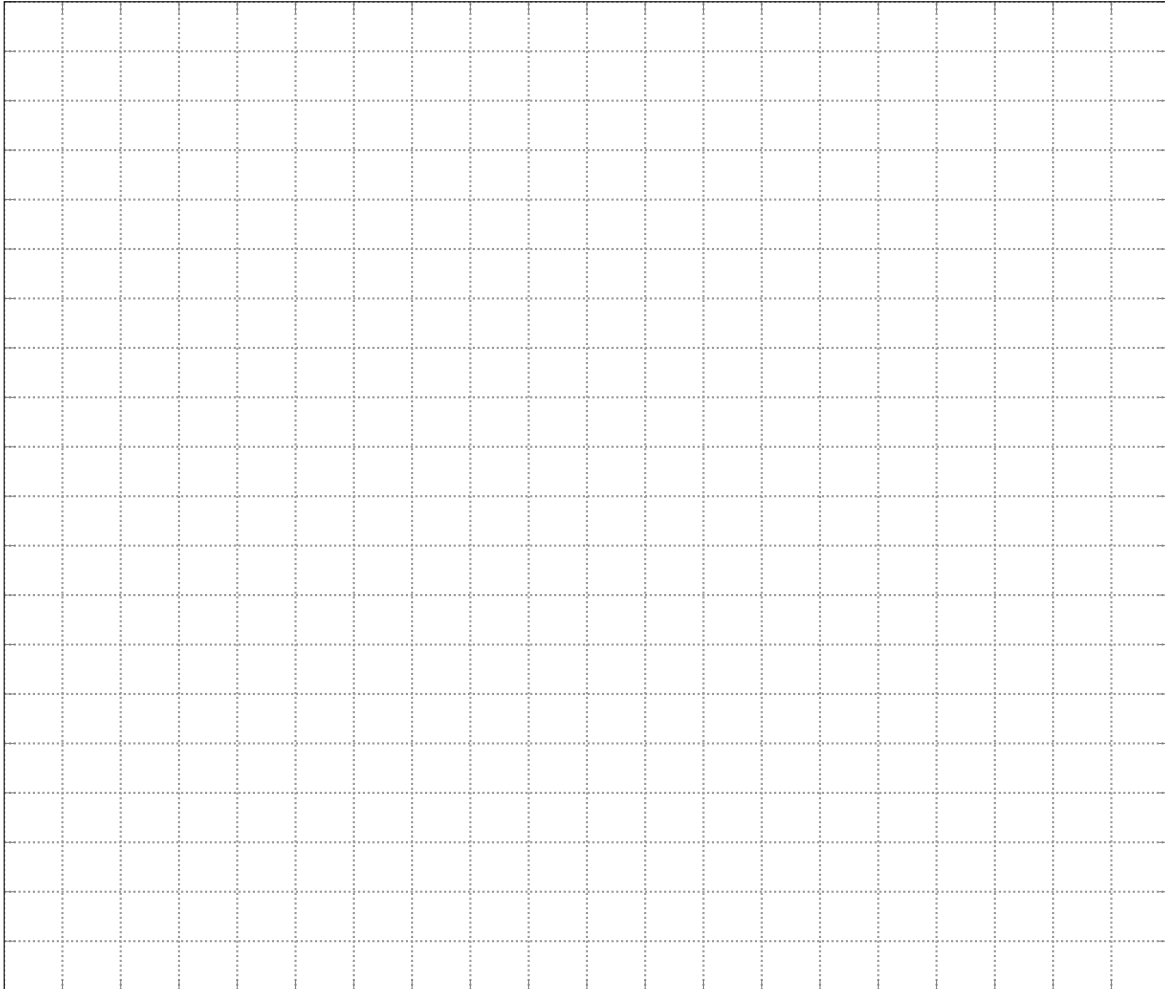
Example 7: Use Desmos to graph the following polar equations:

(1) $r = 2 \cos 3\theta$

(3) $r = -4 \sin 7\theta$

(2) $r = -3 \cos 5\theta$

(4) $r = 5 \sin 3\theta$



Brainstorm: What is the difference between the equations in Example 6 and Example 7? What relationships can you find between the polar equations that look like $r = \pm a \sin n\theta$ or $r = \pm a \cos n\theta$ and their graphs?