

### 3.14B Polar Function Graphs

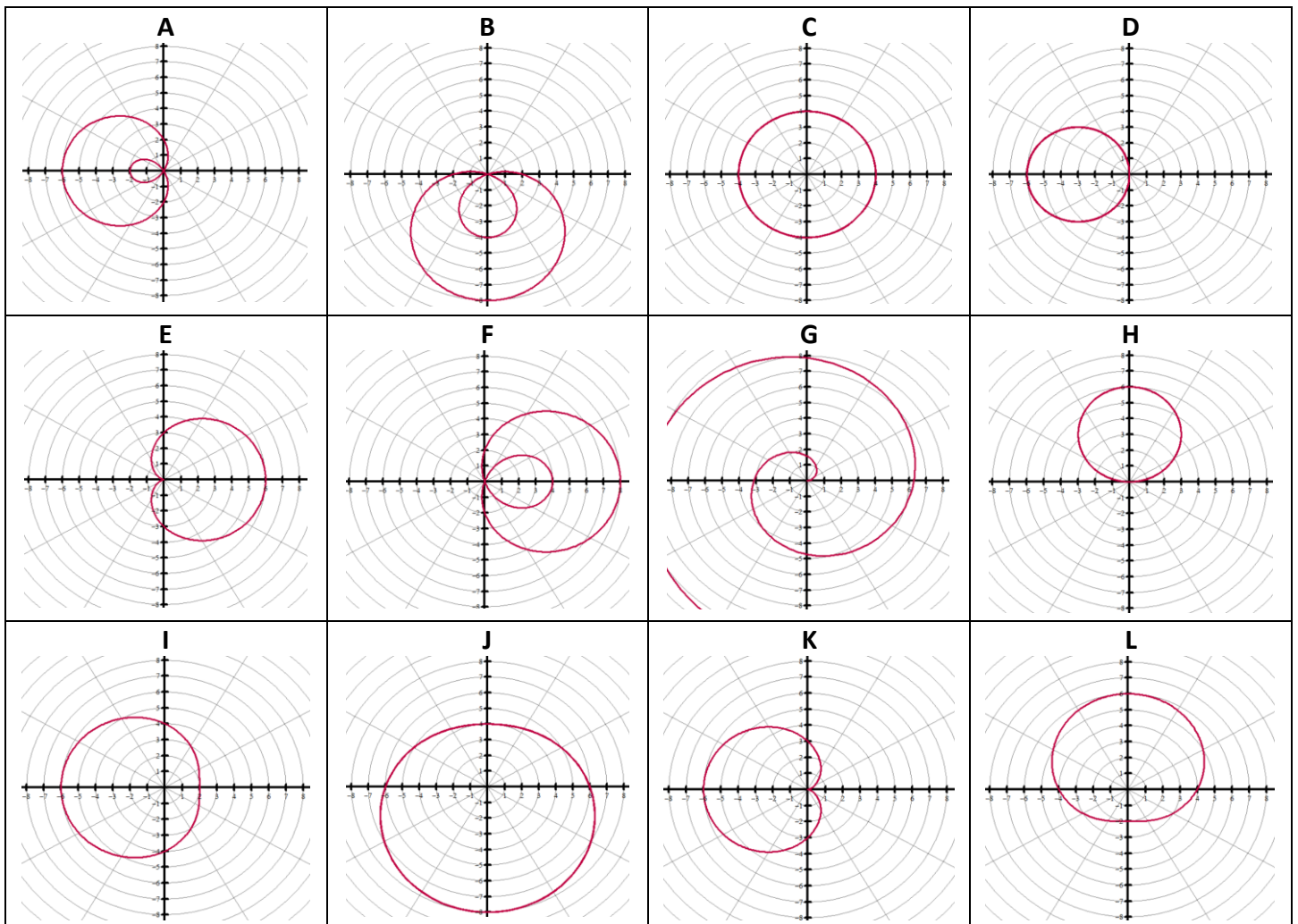
### 3.14B Practice

AP Precalculus

Match the equation to its graph below.

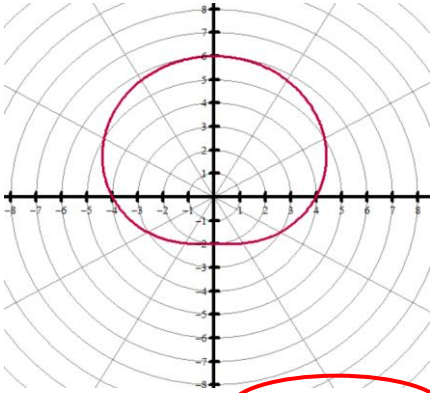
1. $r = 2 + 6 \cos(\theta)$ matches graph: <u>F</u>	2. $r = 2 - 6 \sin(\theta)$ matches graph: <u>B</u>	3. $r = 3 + 3 \cos(\theta)$ matches graph: <u>E</u>
4. $r = 3 - 3 \cos(\theta)$ matches graph: <u>K</u>	5. $r = 2 - 4 \cos(\theta)$ matches graph: <u>A</u>	6. $r = 4 + 2 \sin(\theta)$ matches graph: <u>L</u>
7. $r = 4 - 2 \cos(\theta)$ matches graph: <u>I</u>	8. $r = \theta$ matches graph: <u>G</u>	9. $r = -6 \cos(\theta)$ matches graph: <u>D</u>
10. $r = 6 - 2 \sin(\theta)$ matches graph: <u>J</u>	11. $r = 4$ matches graph: <u>C</u>	12. $r = 6 \sin(\theta)$ matches graph: <u>H</u>

### GRAPHS:



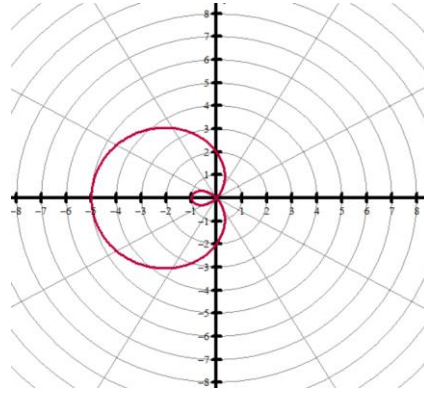
Circle the correct equation for the following polar graphs.

13.



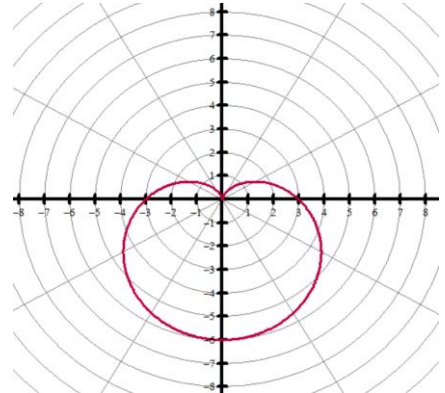
$r = 4 + 2 \cos(\theta)$      **$r = 4 + 2 \sin(\theta)$**   
 $r = 2 - 4 \cos(\theta)$      $r = 2 - 4 \sin(\theta)$   
 $r = 4 - 2 \cos(\theta)$      $r = 4 - 2 \sin(\theta)$

14.



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

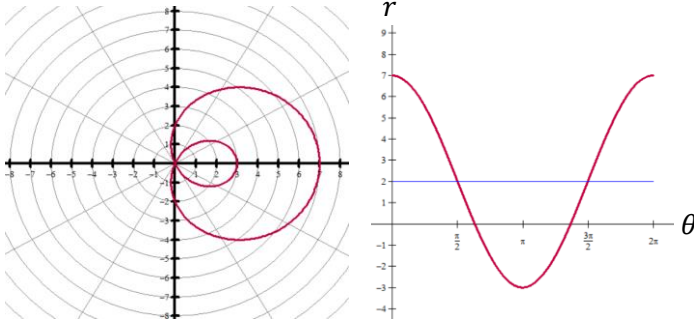
15.



$r = 3 + 3 \cos(\theta)$      $r = 3 + 3 \sin(\theta)$   
 $r = 3 - 3 \cos(\theta)$      **$r = 3 - 3 \sin(\theta)$**   
 $r = 6 - 6 \cos(\theta)$      $r = 6 - 6 \sin(\theta)$

Use the graphs of the polar function  $r = f(\theta)$  and  $y = f(\theta)$  for  $0 \leq \theta \leq 2\pi$  to answer the following.

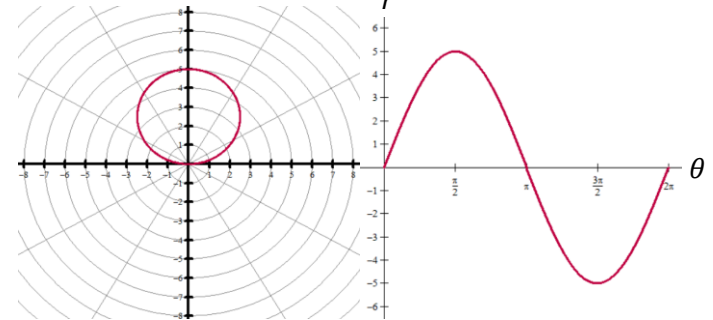
16.



If the domain of  $f$  is restricted to  $\frac{3\pi}{2} \leq \theta \leq 2\pi$ ,

- Is the function **positive** or negative?
- Is the function **increasing** or decreasing?

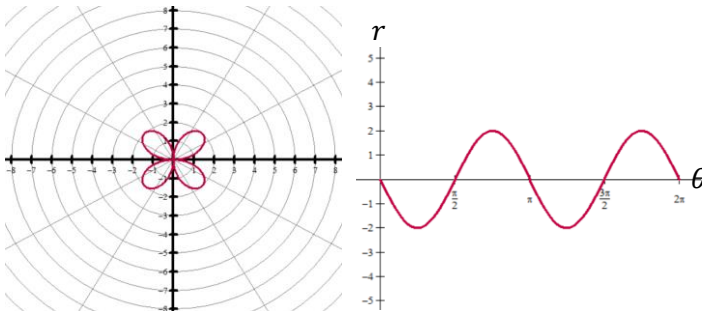
17.



If the domain of  $f$  is restricted to  $\pi \leq \theta \leq \frac{3\pi}{2}$ ,

- Is the function positive or **negative**?
- Is the function increasing or **decreasing**?

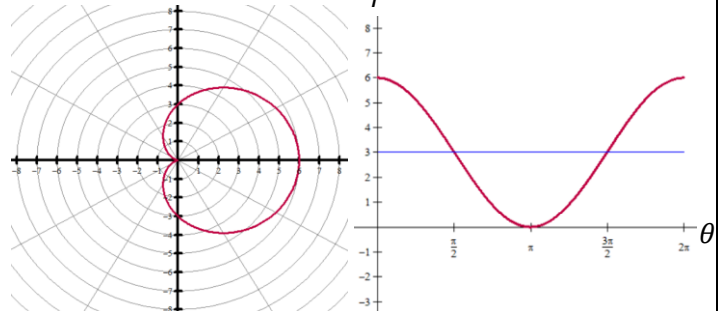
18.



If the domain of  $f$  is restricted to  $\frac{\pi}{4} \leq \theta \leq \frac{\pi}{2}$ ,

- Is the function positive or **negative**?
- Is the function **increasing** or decreasing?

19.



If the domain of  $f$  is restricted to  $0 \leq \theta \leq \frac{\pi}{2}$ ,

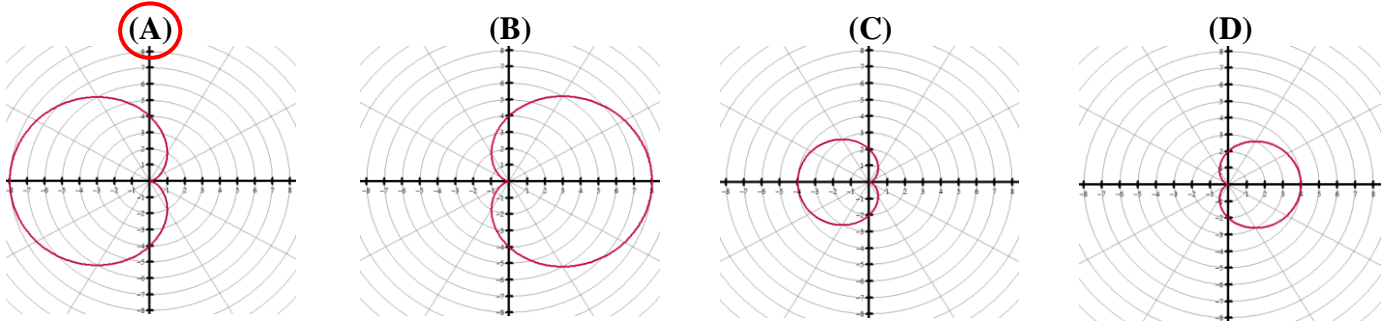
- Is the function **positive** or negative?
- Is the function increasing or **decreasing**?

### 3.14B Polar Function Graphs

## 3.14B Test Prep

20. Which of the following is the graph of the polar function  $r = f(\theta)$ , where  $f(\theta) = 4 - 4 \cos \theta$ , in the polar coordinate system for  $0 \leq \theta \leq 2\pi$  ?

Cardioid  $a = b$ . Negative cosine opens left. Distance from pole is  $4 + 4 = 8$



21. The polar function  $r = f(\theta)$ , where  $f(\theta) = \frac{\pi}{3}\theta$ , is defined for  $\theta > 0$ . Which of the following describes the graph of  $r = f(\theta)$  in the polar coordinate system?

- (A) The graph of  $r = f(\theta)$  is line along the angle  $\frac{\pi}{3}$
- (B) The graph of  $r = f(\theta)$  is a circle with radius of  $\frac{\pi}{3}$
- (C)** The graph of  $r = f(\theta)$  is a spiral with increasing radius
- (D) The graph of  $r = f(\theta)$  is a spiral with decreasing radius

Spiral  $r = \theta$  with increasing radius

$\frac{\pi}{3}$  is coefficient

$r = \frac{1}{\theta}$  would be spiral with decreasing radius

22. The graph of the polar function  $r = f(\theta)$ , is given the polar coordinate system. Which of the following defines  $f(\theta)$  for  $0 \leq \theta \leq 2\pi$  ?

- (A)**  $f(\theta) = 3 - 5 \sin(\theta)$
- (B)  $f(\theta) = 4 - 4 \sin(\theta)$
- (C)  $f(\theta) = 2 - 2 \sin(\theta)$
- (D)  $f(\theta) = 2 - 6 \sin(\theta)$

Inner Loop Limaçon  $a < b$

Negative sine opens down

Inner loop is 2 so  $b - a = 2$

Mas distance from pole is  $a + b = 8$

