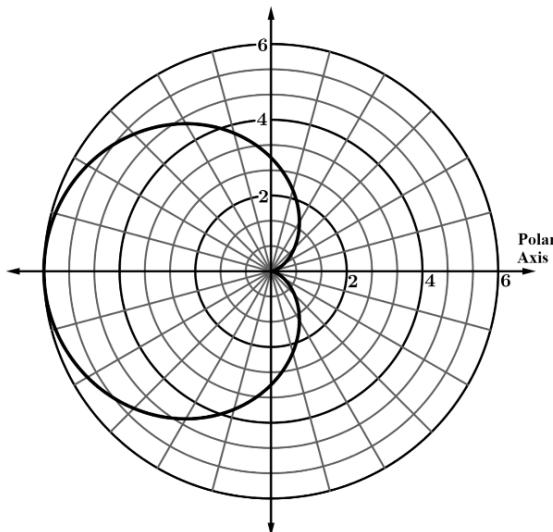
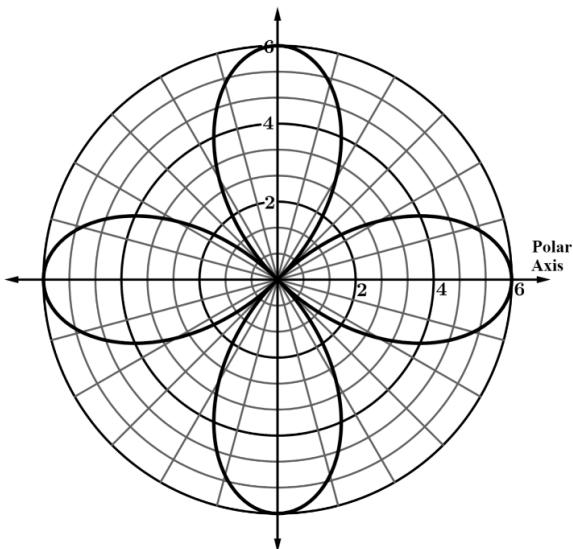


1. The figure shows the graph of the polar function  $r = f(\theta)$ , for  $0 \leq \theta \leq 2\pi$ , in the polar coordinate system. Which of the following could be an expression for  $f(\theta)$ ?
- (A)  $2 + 4 \sin \theta$       (B)  $2 - 4 \sin \theta$       (C)  $2 + 4 \cos \theta$       (D)  $2 - 4 \cos \theta$

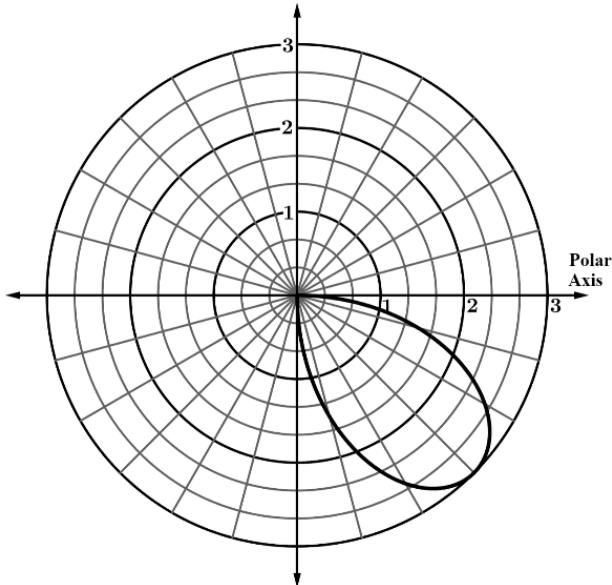


2. The figure shows the graph of the polar function  $r = f(\theta)$ , for  $0 \leq \theta \leq 2\pi$ , in the polar coordinate system. Which of the following could be an expression for  $f(\theta)$ ?
- (A)  $3 + 3 \sin \theta$       (B)  $3 - 3 \sin \theta$       (C)  $3 + 3 \cos \theta$       (D)  $3 - 3 \cos \theta$



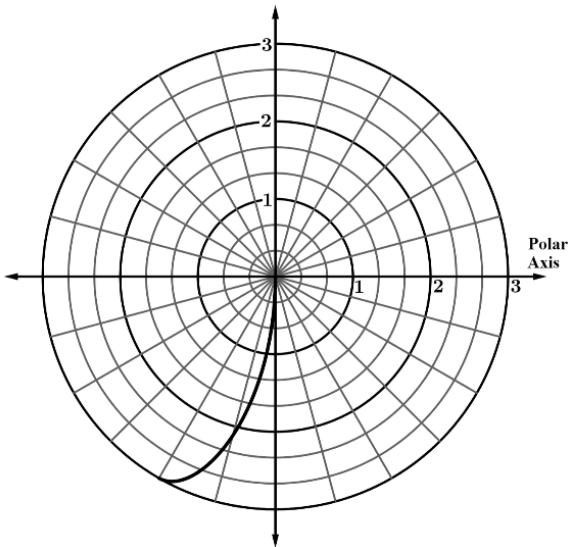
3. The figure shows the graph of the polar function  $r = f(\theta)$ , for  $0 \leq \theta \leq 2\pi$ , in the polar coordinate system. Which of the following could be an expression for  $f(\theta)$ ?

- (A)  $6\cos(2\theta)$       (B)  $6\cos(4\theta)$       (C)  $6\sin(2\theta)$       (D)  $6\sin(4\theta)$



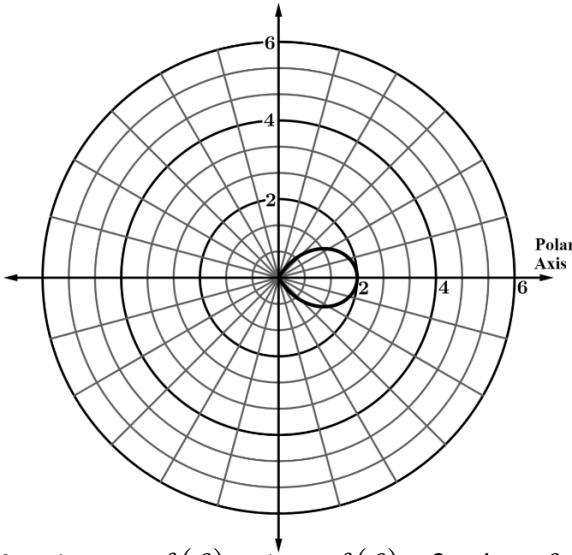
4. A portion of the graph of the polar function  $r = f(\theta)$ , where  $f(\theta) = 3\sin(2\theta)$ , is shown in the polar coordinate system for  $a \leq \theta \leq b$ . If  $0 \leq a < b < 2\pi$ , which of the following could be the values for  $a$  and  $b$ ?

- (A)  $a = \frac{\pi}{4}$  and  $b = \frac{\pi}{2}$       (B)  $a = \frac{\pi}{2}$  and  $b = \pi$       (C)  $a = \frac{3\pi}{4}$  and  $b = \pi$       (D)  $a = \frac{3\pi}{2}$  and  $b = 2\pi$



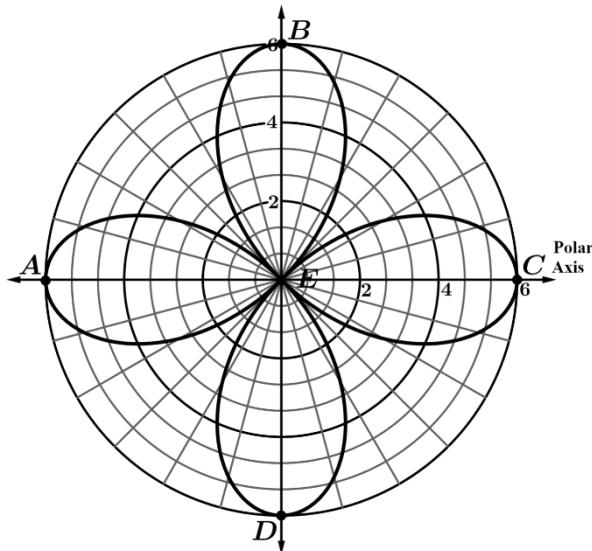
5. A portion of the graph of the polar function  $r = f(\theta)$ , where  $f(\theta) = 3 \cos(3\theta)$ , is shown in the polar coordinate system for  $a \leq \theta \leq b$ . If  $0 \leq a < b < 2\pi$ , which of the following could be the values for  $a$  and  $b$ ?

- (A)  $a = 0$  and  $b = \frac{\pi}{6}$       (B)  $a = \frac{\pi}{6}$  and  $b = \frac{\pi}{3}$       (C)  $a = \frac{\pi}{3}$  and  $b = \frac{\pi}{2}$       (D)  $a = \frac{5\pi}{4}$  and  $b = \frac{3\pi}{2}$

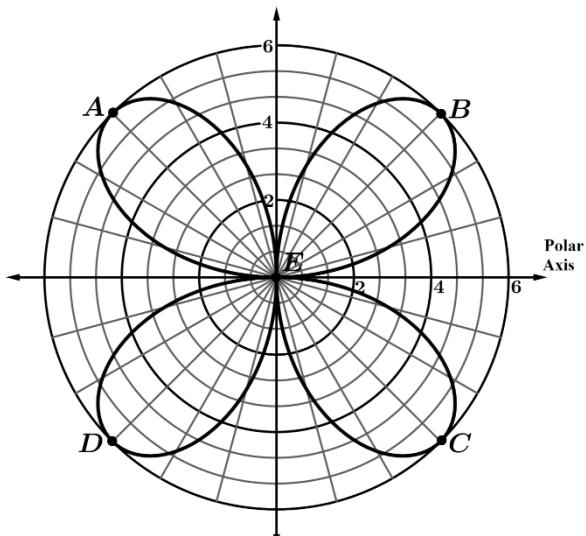


6. A portion of the graph of the polar function  $r = f(\theta)$ , where  $f(\theta) = 2 + 4 \cos \theta$ , is shown in the polar coordinate system for  $a \leq \theta \leq b$ . If  $-2\pi \leq a < b < 2\pi$ , which of the following could be the values for  $a$  and  $b$ ?

- (A)  $a = -\frac{2\pi}{3}$  and  $b = \frac{2\pi}{3}$   
 (B)  $a = -\frac{\pi}{3}$  and  $b = \frac{\pi}{3}$   
 (C)  $a = \frac{\pi}{2}$  and  $b = \frac{3\pi}{2}$   
 (D)  $a = \frac{2\pi}{3}$  and  $b = \frac{4\pi}{3}$



7. The figure shows the graph of the polar function  $r = f(\theta)$ , where  $f(\theta) = 6 \cos(2\theta)$ , in the polar coordinate system for  $0 \leq \theta \leq 2\pi$ . There are four points labeled  $A, B, C, D$  and  $E$ . If the domain of  $f$  is restricted to  $\frac{\pi}{2} \leq \theta \leq \pi$ , the portion of the given graph that remains consists of two pieces. One of those pieces is the portion of the graph in Quadrant IV from  $D$  to  $E$ . Which of the following describes the other remaining piece?
- (A) The portion of the graph in Quadrant II from  $B$  to  $E$
  - (B) The portion of the graph in Quadrant II from  $E$  to  $A$
  - (C) The portion of the graph in Quadrant III from  $E$  to  $D$
  - (D) The portion of the graph in Quadrant IV from  $E$  to  $C$



8. The figure shows the graph of the polar function  $r = f(\theta)$ , where  $f(\theta) = 6\sin(2\theta)$ , in the polar coordinate system for  $0 \leq \theta \leq 2\pi$ . There are four points labeled  $A, B, C, D$  and  $E$ . If the domain of  $f$  is restricted to  $\frac{\pi}{2} \leq \theta \leq \frac{3\pi}{4}$ , which of the following describes the portion of the given graph?
- (A) The top portion of the graph in Quadrant II from  $E$  to  $A$
  - (B) The bottom portion of the graph in Quadrant II from  $A$  to  $E$
  - (C) The top portion of the graph in Quadrant IV from  $C$  to  $E$
  - (D) The bottom portion of the graph in Quadrant IV from  $E$  to  $C$