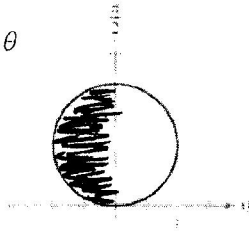


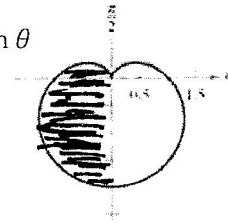
Practice 4.7: Polar, Area, & Arc Length

Write an integral that represents the area of the shaded region in the figure. Do not evaluate the integral.

1)  $r = 2 \sin \theta$



2)  $r = 1 - \sin \theta$



3) Find the area of the region bounded by the graph of the polar equation  $r = 8 \sin \theta$  using the following:

a) a geometric formula

b) integration

Find the area of the region.

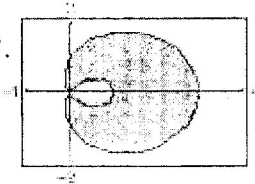
4) One petal of  $r = 2 \cos 3\theta$ .

5) One petal of  $r = \cos 2\theta$ .

6) Interior of  $r = 1 - \sin \theta$ .

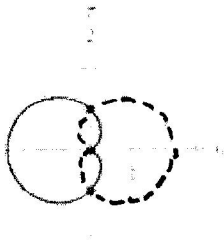
7) Inner loop of  $r = 1 + 2 \cos \theta$ .

8) Between the loops of  $r = 1 + 2 \cos \theta$ .

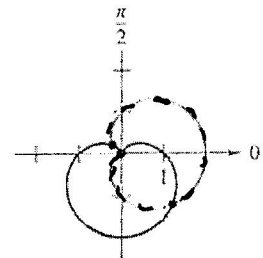


Find the points of intersection of the graphs of the equations.

9)  $r = 1 + \cos \theta$   $r = 1 - \cos \theta$



10)  $r = 1 + \cos \theta$   $r = 1 - \sin \theta$



11)  $r = 4 - 5 \sin \theta$

$r = 3 \sin \theta$

12)  $r = \frac{\theta}{2}$

$r = 2$

13)  $r = 4 \sin 2\theta$

$r = 2$

14) Find the length of the curve  $r = 1 + \sin \theta$  over  $[0, 2\pi]$ .