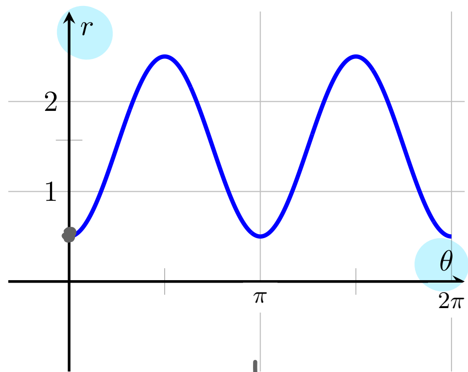
Turn these problems in:

WebAssign matching, check points

θ	r

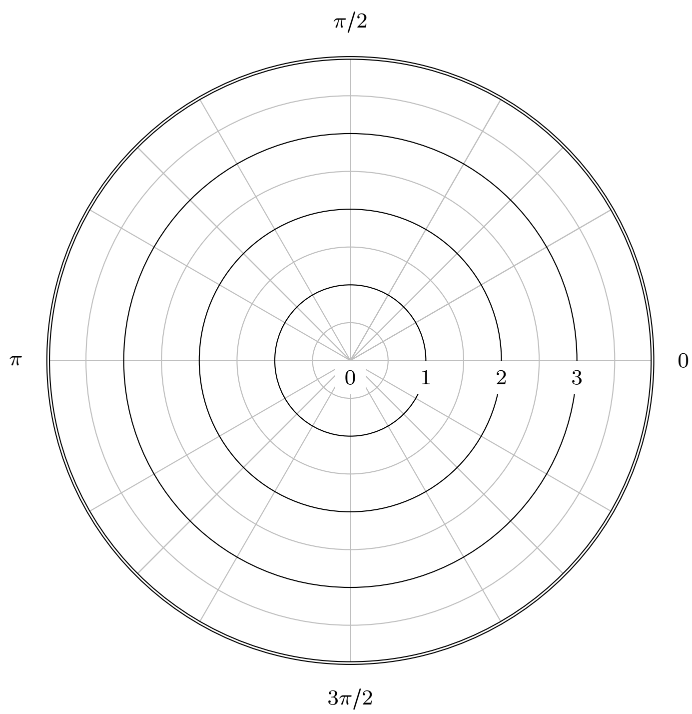
1. The figure shows a graph of r as a function of θ.



polar

Use the graph to sketch the corresponding polar curve ~~on the Cartesian xy-plane, using polar coordinates~~. Explain the reasoning for your sketch.

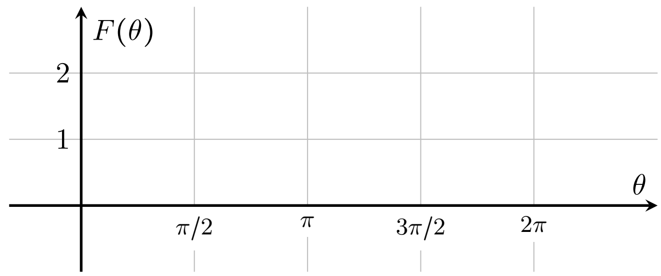
polar graph



2. Consider the curve C defined by

$$r = F(\theta) = 1 - \sin(\theta)$$

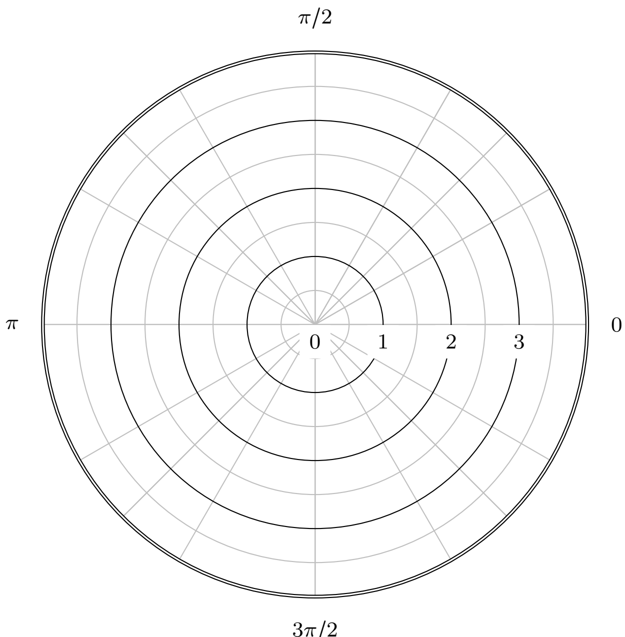
(a) Sketch the graph of $F(\theta)$ for $0 \le \theta \le 2\pi$.



i. Explain and clearly indicate the points where $F(\theta) = 0$.

ii. Explain and clearly indicate the points where F attains a local maximum or minimum.

(b) By using the results obtained in **Part (a)** sketch C on the Cartesian xy-plane, using polar coordinates for $0 \le \theta \le 2\pi$.



(c) Write C in parametric form by using:

← just plug in $F(\theta) = 1 - \sin\theta$

$$x = r\cos(\theta) = F(\theta)\cos(\theta)$$
$$y = r\sin(\theta) = F(\theta)\sin(\theta)$$

★ similar to ex. in 7-10-24 notes

(d) Using the parametric form,

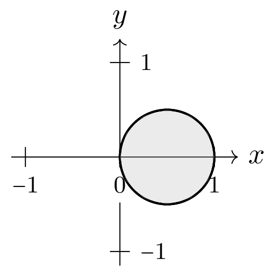
i. Find all horizontal points of tangency. ← $dy/d\theta = 0$

ii. Find all vertical points of tangency. ← $\frac{dx}{d\theta} = 0$

iii. Sketch these points in polar coordinates.

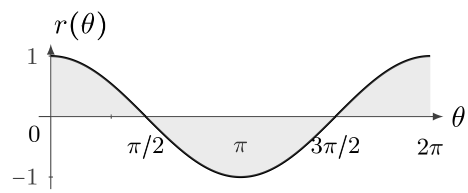
BUT if both $= 0$, take a limit

3. Lee is working to find the area enclosed by the polar curve $r(\theta) = \cos(\theta)$ from $0 \le \theta \le 2\pi$. Lee graphed the areas of polar curve on the Cartesian xy-plane using polar coordinates



} polar curve

and the graph of r as a function of θ



} graphed in $r\theta$-plane

When looking at the both areas, Lee notices that there is equal amounts of area above and below the horizontal axis of both graphs. Lee argues that because of this the area enclosed by the polar curve $r(\theta) = \cos(\theta)$ from $0 \le \theta \le 2\pi$ is equal to zero. Explain if Lee's reasoning is valid or not.

4. Find the exact length of the polar curve $r = e^{2\theta}$, $0 \le \theta \le 2\pi$.

Use $ds = \sqrt{r^2 + \left(\frac{dr}{d\theta}\right)^2}\, d\theta$

5. Find the area of the region that lies inside the curve whose polar equation is $r = 3\sin\theta$ and outside the curve whose polar equation is $r = 2 - \sin\theta$. (Hint: First, sketch the two curves on the same axes and shade the region of interest.)

6. Given the following formulas, match each with one of the graphs below. Explain your reasoning for your pairings.

(a) $s_n = 1 - \dfrac{1}{n}$

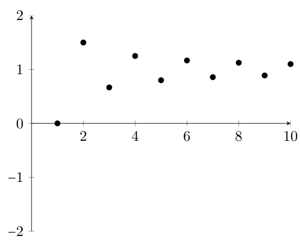
(b) $s_n = 1 + \dfrac{(-1)^n}{n}$

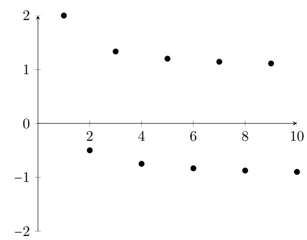
(c) $s_n = \dfrac{1}{n}$

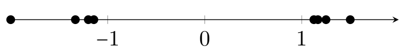
(d) $s_n = 1 + \dfrac{1}{n}$

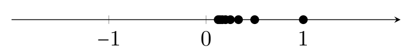
(e) $s_n = (-1)^n + \dfrac{(-1)^n}{n}$

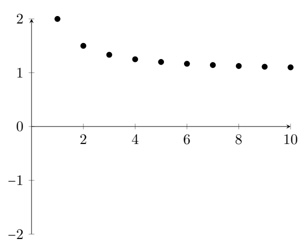
(f) $s_n = (-1)^n + \dfrac{1}{n}$

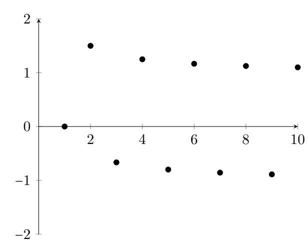
I. 

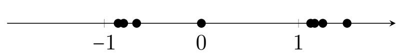
V. 

II. 

VI. 

III. 

VII. 

IV. 

VIII.