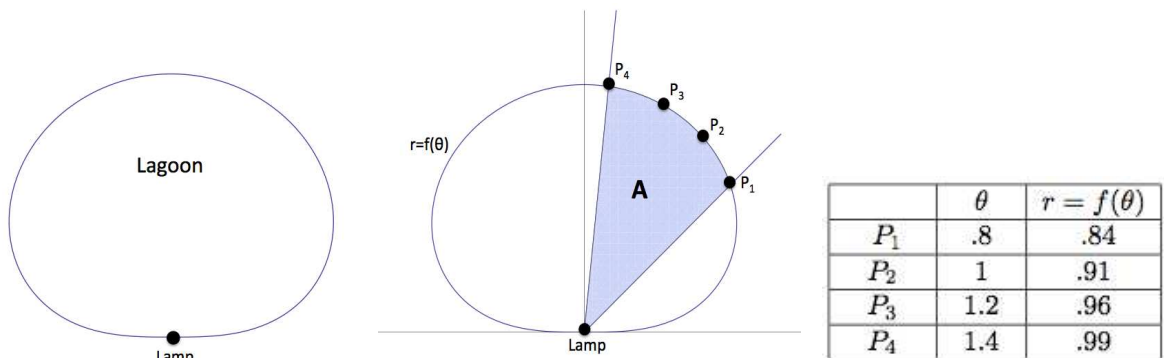


8. [13 points] A lamp is at the border of a small lagoon. The picture below shows the lamp at the origin and the lagoon described by the polar curve $r = f(\theta)$. During the night, the lamp illuminates the shaded region on the lagoon shown below.



- a. [3 points] If A is the shaded area shown above, then $A = \int_a^b F(\theta)d\theta$ where

$F(\theta) =$ _____ $a =$ _____ $b =$ _____.

- b. [5 points] Fill the table below with the values of $F(\theta)$. Then approximate the area of the shaded region using Left(3). Write all the terms in your sum.

θ	.8	1	1.2	1.4
$F(\theta)$				

- c. [1 point] Is $F(\theta)$ increasing, decreasing or neither?
- d. [1 point] Is $F(\theta)$ concave up, concave down or neither?
- e. [3 points] Which Riemann sums (Left(3), Right(3) and/or Trap(3)) yield an underestimate of the shaded area?