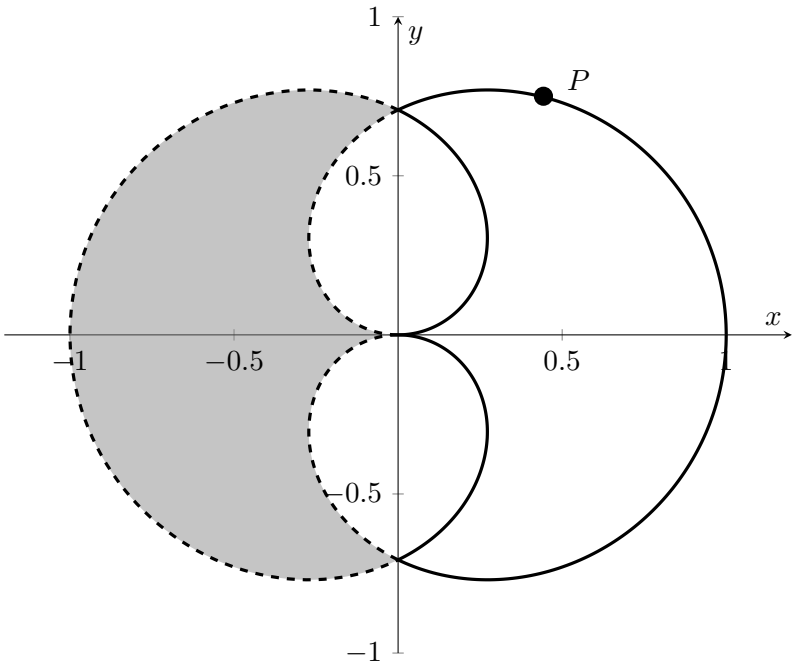
7. [16 points] A particle moves along a path given by the polar curve $r = \cos(\theta/2)$, $0 \le \theta \le 4\pi$. The polar curve is graphed below. A portion of the polar curve is dashed.



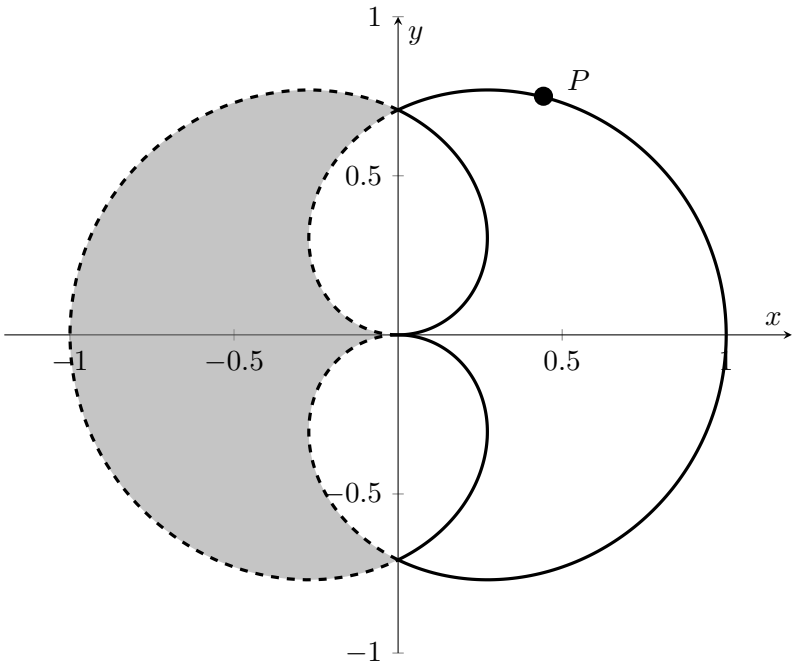
a. [4 points] The distance from the origin to the point labeled P is $\sqrt{3}/2$. Find the Cartesian coordinates corresponding to the point labeled P.

$(x, y) =$ _____

b. [4 points] For what values of θ in $[0, 4\pi]$ does the particle pass through the origin?

$\theta =$ _____

7. (continued) The graph of the polar curve $r = \cos(\theta/2)$, with $0 \leq \theta \leq 4\pi$, from the previous page is reproduced below:



c. [4 points] Determine the interval(s) within $[0, 4\pi]$ for which θ traces out the **dashed** portion of the graph.

Answer: _____

d. [4 points] Write an expression involving one or more integrals for the shaded area enclosed by the dashed portion of the particle's path. Do not evaluate your integral(s).

Answer: _____