

2. [8 points] For this problem, consider the family of polar curves described for each positive integer $n \geq 1$ by

$$r = \frac{\cos(2n\theta)}{n}$$

for $0 \leq \theta \leq 2\pi$.

- a. [2 points] Consider the polar curve described by $r = \cos(2\theta)$ for $0 \leq \theta \leq 2\pi$. (Note that this is the case of $n = 1$.) Find all values of θ between 0 and 2π for which the curve $r = \cos(2\theta)$ passes through the origin.

Answer: $\theta =$ _____

- b. [3 points] For $n \geq 1$, find all x -intercepts of the polar curve $r = \frac{\cos(2n\theta)}{n}$. Your answer(s) may involve n .

Answer: $x =$ _____

- c. [3 points] For $n \geq 1$, let A_n be the arclength of the polar curve $r = \frac{\cos(2n\theta)}{n}$ for $0 \leq \theta \leq 2\pi$. Write, but do not evaluate, an expression involving one or more integrals that gives the value of A_n .

Answer: $A_n =$ _____