5. [16 points] The following problems relate to the polar graph shown below, defined by the polar curve \( r(\theta) = 2\sin(2\theta) + 1 \), on the domain \([0, 2\pi]\). Both the dashed and solid curves are part of the graph of \( r(\theta) \).
a. [4 points] Find all $\theta$ values in the interval $[0, 2\pi]$ such that $r(\theta) = 0$.

Answers: ___________________________

b. [4 points] Determine the $\theta$ intervals corresponding to the dashed portions $A$ and $B$ of the curve above.

Interval for $A$: ______________________  Interval for $B$: ______________________
c. [4 points] Write an expression involving one or more integrals for the area of the region enclosed by the solid curves only (do not include the region enclosed by the dashed curves).

d. [4 points] Write an expression involving one or more integrals for the total arc length of the dashed curves in the graph above.