chloe choi is standing at the origin on a dock with insignificant width that follows the graph of the equation $r = 2\sin\theta + \cos 2\theta$.

a) what is the total amount of water encircled by this dock (i.e. the area completely enclosed within any section of this graph)?

b) her mother, mr. proulx, has fallen into the water at the point $\left(0, \frac{3}{4}\right)$. chloe has a lifesaver that she can throw to save her mother. how close can she get to her mother (i.e. what is the closest point on the graph to this point)?

c) chloe can run one unit per second, and chloe's mom can only float for 2.5 more seconds. if chloe wants to be as close as she possibly can before throwing the lifesaver, will chloe be able to save him?