

Oct. 27-29

Please submit a solution to your instructor by Friday, October 30 before 5 pm.

1. $((1/(N+1))$ points) Four bugs are placed at the four corners of a square with side length a . The bugs crawl counterclockwise at the same speed and each bug crawls directly toward the next bug at all times. They approach the center of the square along spiral paths. (For example, see page 699 in your textbook.) Place two opposite corners of the square at $(\frac{a}{2}, \frac{a}{2})$ and $(-\frac{a}{2}, -\frac{a}{2})$ on a rectangular coordinate system so that the center of the square is at the origin and the sides of the square are parallel to the axes.
- (a) Find the polar equation of the bug's path for the bug that starts at $(\frac{a}{2}, \frac{a}{2})$. (Hint: use the fact that the line joining one bug to the next is tangent to the bug's path.)
- (b) Find the distance that this bug has traveled by the time it meets the other bugs at the center.

